

FOOD

BY

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(AGRICOLA)

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WITH FOREWORD BY DISCOUNT MILNER, K.G.

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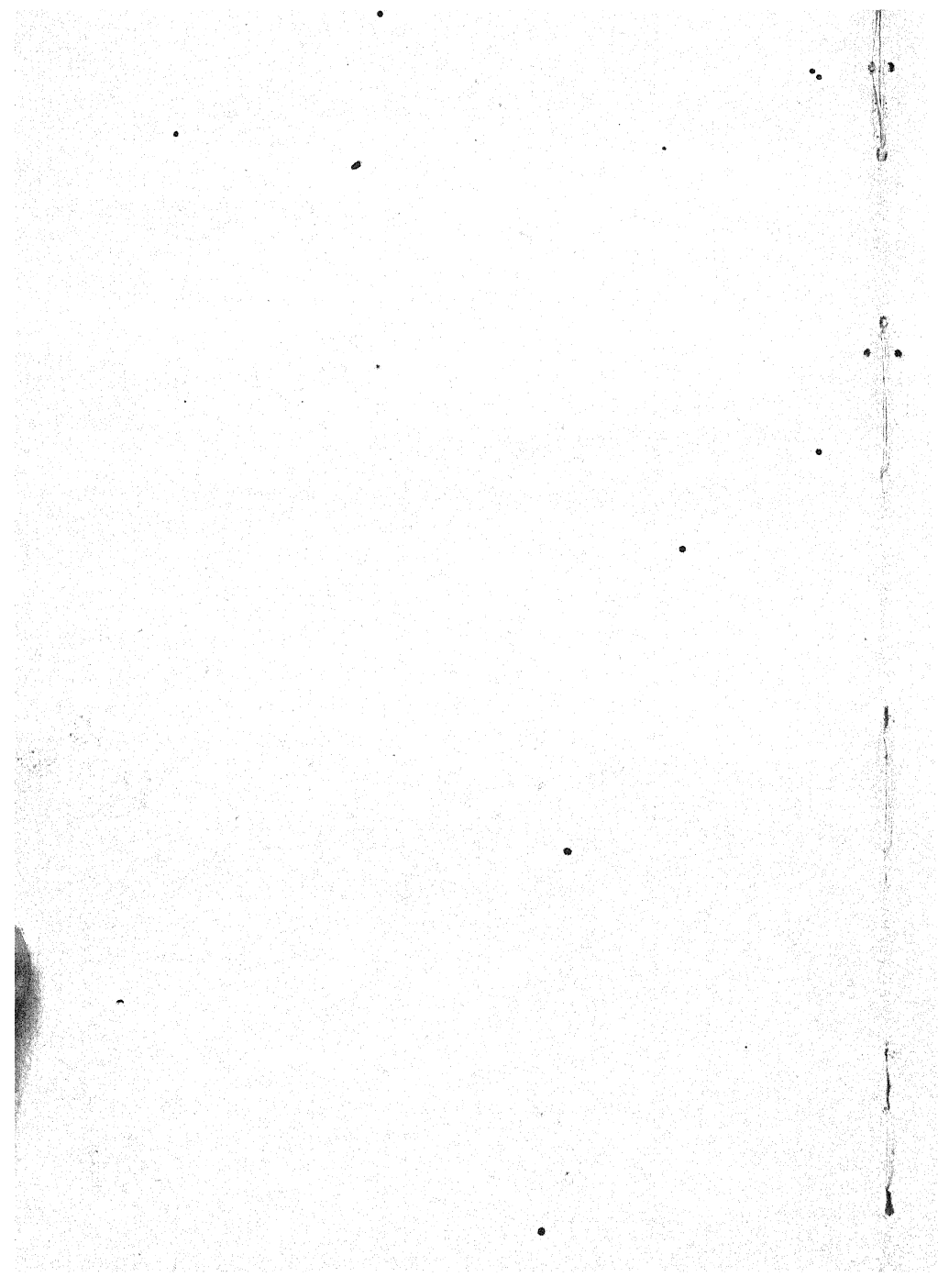
FOREWORD

THE plight of Agriculture is once more exciting a certain amount of public attention, and there is a revival of the hope, so often disappointed, that the urban majority of the Nation can be made to realize their own vital interest in the maintenance of a flourishing rural industry.

Under these circumstances, the publication of a book like this is peculiarly opportune, and I hope that it may be very widely read. The writer, as I well know, has given years of time and thought to the subject, and he has amassed an amount of information, here set forth, which no man who takes the question seriously can afford to neglect. And certainly nothing is better calculated to awaken the Townsman to all that is at stake *for him* in the prosperity of the Countryman, than this powerful statement of the Case for Home Production.

MILNER.

January 22nd, 1923.



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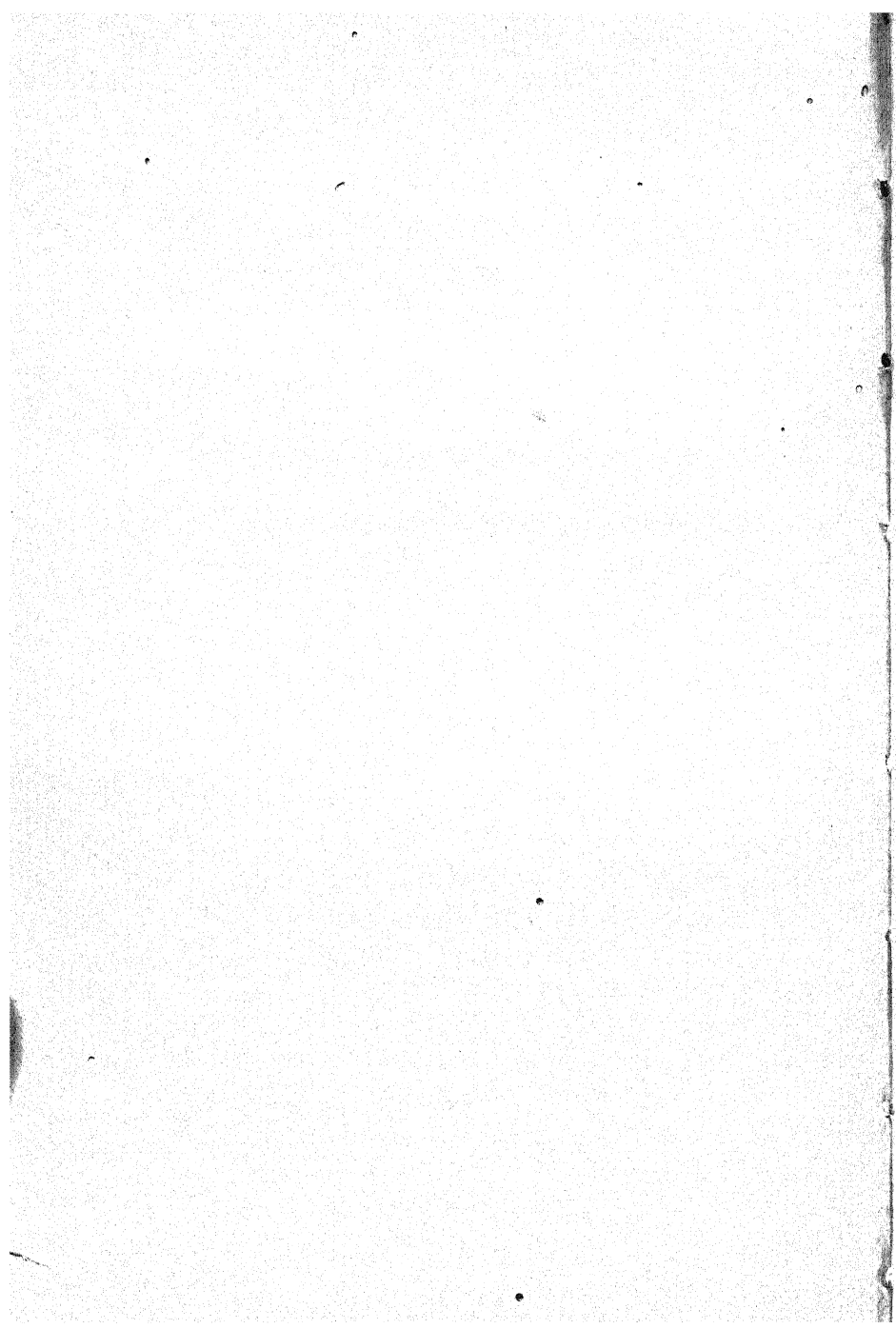
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CHAPTER I

CHAPTER NO. 1



FOOD

AGRICULTURE, as it affects the Nation's Economics, is a subject which has received little or no continuous thought or attention from anyone. A few Politicians, who have been awakened to the magnitude of the subject, have taken it up for a time, but have then allowed their attention to be diverted to matters of more immediate attraction.

Questions of domestic or local interest, of course, have, from time to time, been stirred up by the so-called Agricultural Members and, in the old days, by Landlords. Such problems as Ground Game, Compensation for Agricultural Improvements, Fixity of Tenure, have ranked amongst such domestic matters, but of the Nation's life, as seriously influenced by its Agricultural Production, nothing much was heard for many years before the War.

After nearly a year of war, and under the stress of the first serious Submarine menace, Mr. Asquith formed a Committee, under the Chairmanship of Lord Milner, to ascertain how we could produce food in greater volume, but, although the findings of the

Committee—on which were several strong Free Traders—were unanimously in favour of immediately developing British Agriculture, the matter was not dealt with and no action was taken by the Government.

The following sentence from a separate Report, signed by the majority of the Milner Committee, including all its Agricultural Members, may be quoted, viz. :

“ We desire to place on record our opinion that it is necessary and practicable to produce within this country a very large proportion of the food-stuffs and other agricultural products natural to its soil, but now purchased abroad at a cost of nearly £300,000,000 per annum, two-thirds of which are derived from countries outside the British Empire. We believe that this can be done to the physical, social and economic advantage of the country.”

It was not till early in 1917, after the First Corn Production Act was passed, that any definite step was taken to obtain more home-grown food. The Food Production Department of the Government was then established, and, within eighteen months, the energies of the Country had been so brought to bear on the subject that the increased Home Production for 1918 harvest amounted to 6,000,000 tons of food above the normal pre-war production.

In November of 1918, in his celebrated speech on the Future of England, Mr. Lloyd George said :

“Agriculture was almost completely neglected by the State. During recent years very, very little was done—more, perhaps, than used to be, but very little. It was just like feeding a giant with a teaspoon. In 1913 £300,000,000 worth of the products of the soil were imported from abroad which could have been produced here.”

In 1920, the Corn Production Amendment Act was passed, giving a guarantee to British Farmers for five years, under which they could make no loss if they produced the cereals needed for British food.

In June, 1921, the British Minister of Agriculture, Sir Arthur Griffith-Boscawen, with, it is understood, the consent of the Cabinet, by tearing up the Treaty with the English producers of food, committed an act that ranks only second to the declaration of War by the Kaiser in the serious effects it will have upon the National welfare of Great Britain. This act of treachery and broken pledge was committed without any excuse of agitation or outside pressure. It was a breach of faith to the whole community, many farmers having bought their holdings on the strength of the guarantee. It will be long before anyone will again act under Government guarantees. Had our late enemies desired to get this Country into the worst possible position for a future war, they could not have imagined anything that would have put us at their mercy so completely as this overthrow of British Agriculture.

Already much of the land brought under cultivation during the stress of war, and under the guarantees

of Parliament against loss, is going back to a semi-prairie condition. In 1921, the imports of Food which could be produced from our own soil amounted to £500,000,000.

* * * * *

Unless the rates of wages to be paid in the Factories, Mines, Metal Works, Railways and Docks of England are to fall to lower levels than even those paid before the War, it is becoming evident that, owing to the cost of our manufactured goods, when delivered to foreign consumers, they will not find ready purchasers in many of the Export Markets.

The War, and all that has happened since, has entirely altered the bases on which England was formerly able to maintain large Exports of Manufactures.

The causes are numerous. In the first place, during the War, we were unable to supply, or transport, many of the goods which foreign nations and our Colonies were in the habit of getting from us. This, in some instances, taught our buyers to supply themselves by home production, or by Imports of a different quality of goods from other Countries. And, in many cases, foreign consumers, trained by shortage during the War, have learnt, especially in these times of world-wide poverty, that they can do without a good many things they had got into the habit of using.

After the War, stocks in foreign Countries of certain commodities which cannot be dispensed with having fallen very low, there was a temporary boom in

British Export Trade. In 1921 and 1922, however, the immediate and urgent demand having been satisfied and the fall in Foreign Exchanges having become much more acute, the Export boom died out.

The World's consumption of food and clothes and absolute necessities will go on, but, in these essential commodities, every Nation—except ourselves—has learnt how necessary it is to become independent of food transported overseas, and most Nations are rapidly becoming self-supplying.

In manufactured goods, the strain to occupy the labour and resources of each Country is every day also tending more towards self-dependence and home production.

Again, the stress of shortage of money is forcing foreign Countries and our Colonies to accept goods of a lower quality than they formerly got from us. The teeming population of India and Japan are now well established as manufacturers and exporters of cotton goods, hosiery and repetition work in metals.

Again, Germany, with its low Exchange, is a deadly enemy to our factory workers by its competition with unparalleled cheap products.

The splendid commercial and organizing ability of the United States, and their colossal manufacturing plants, are also enabling that Country—even in face of its very high wages and standard of living—to compete with us in many kinds of exported manufactures. The States have, within themselves, every Raw Material of importance, except rubber and tin. In this Country, except for coal, which is now at a

prohibitive price, we use hardly any home-produced Raw Materials in making what we export, but pay enormous sums to the States for our cotton and copper; to Spain, Greece and Sweden for our iron ores; to Egypt for best-class cotton; to Australia, the Argentine and South Africa for our wool, and to India for all our jute.

Therefore, for the manufactured goods we do export, we pay heavy tribute to foreign Countries. In fact, between one-third and one-half of the value of our export of manufactured goods is paid to foreigners for Raw Materials entering into them, and is, therefore, a heavy handicap when competing with those Countries.

Do our Factory Owners, Railway and Dock Managers and the workers in all these enterprises realize that this Country, having, by its genius and enterprise, made a very early start in supplying the world's markets with machine-made goods, has been able to keep its lead for nearly a hundred years? Do they further realize that the War, having called a halt for several years in our exports, broke up the continuity of markets and flow of trade, and gave time for the other causes enumerated above, and more especially the disorganization of the Exchanges, to undermine our position as exporters to such a degree that, in future, manufacturing for export is likely to be one of our lesser industries instead of our greatest?

This book is not about manufactured goods, or their export markets, but it is necessary to point out that, in normal times, we were able, by the prices we got abroad for our exported goods, to pay for our Imports,

and, taking the year 1913 as the last year not affected by the War, the figures were :

	£
Exports of Coal	54,000,000
" " Manufactured Goods	411,000,000
" " Sundries	60,000,000
<hr/>	
Making the total of Exports shown by the Board of Trade as	525,000,000
<hr/>	

During that same year, which was not an abnormal one, our Imports were :

	£
Raw Materials chiefly used in manu- facturing	219,000,000
Manufactured Goods	201,000,000
Food and other Soil Products	300,000,000
Other Imports	48,000,000
<hr/>	
	768,000,000
<hr/>	

This shows a balance against us of £243,000,000, but at that time we were able to pay for the surplus of imports by the income derived from our very large foreign investments and by the profits of our foreign carrying trade. Now, however, the income from our foreign investments, of which we had to part with some 1,000 millions during the War, is greatly reduced, while we shall also have to pay to the United States (for interest and sinking fund on our debt to them) nearly £40,000,000 a year.

It would, therefore, seem that the Nation's prosperity, welfare and the happiness of its people, in future, must largely depend upon some alteration in

economic practice which will tend towards the decrease of expenditure abroad, because we know that we have already lost a very large proportion of our income from exporting coal and it is very unlikely that we shall—at any rate for ten or twenty years—regain the foreign Export Markets for the same quantities of manufactured goods we sent abroad in 1913.

The following Table shows what can be done towards decreasing Imports. What does it matter to us as a Nation if we do not regain part of our Foreign Markets for manufactured goods, if we can avoid the importation of £300,000,000 worth of Soil Products? We should be producing these at home through the work of those hands who would not be required in the factories if we fail to recover all our trade in export manufactured goods :

TABLE I

LIST OF IMPORTS WHICH CAN BE PRODUCED FROM THE SOIL OF
THE UNITED KINGDOM.

(Figures from Government Returns.)

Description.	Imports. 1913.	Imports. 1921.
	£	£
Cereals, grain and flour	84,403,247	138,084,686
Meat (other than pork and bacon) ..	32,365,355	76,289,094
Wood and timber	33,788,884	20,039,165
Vegetables	5,492,113	12,092,111
Flowers, fresh	288,728	145,792
Fresh fruit (not oranges or bananas).	6,468,391	17,084,866
Jam and preserved fruit	1,187,621	4,441,189
Sugar	23,066,621	35,293,957
Hops	1,753,003	3,809,290
Eggs and poultry	10,583,066	16,375,280
Rabbits and rabbit skins (say).....	1,598,980	1,549,763
Milk	2,185,462	9,975,415
1913		
Butter	24,083,658	
Cheese	7,035,039	
Lard	5,776,291	
Margarine ...	3,917,701	
	40,812,689	75,966,566
Bacon, hams and pork	22,162,627	55,501,347
Wool.....	40,784,170	45,822,946
Totals	306,940,957	512,471,467

Should we not feel safer with all our food grown at home than while we are at the mercy of any Power which may choose to keep a fleet of 200 or 300 Submarines ?

Have not most of our troubles the world over come from the attempt to force our rule or will upon foreign

peoples, chiefly for the sake of getting and holding foreign Markets for manufactured goods ?

Has not the enormous expenditure on our Navy and Army at bottom really been based on this attempt to corral foreign Markets for Manchester, Leeds, Birmingham, Bradford and Sheffield ?

Have not the problems surrounding the export of manufactures so occupied the thoughts and attention of our Statesmen, and the vote-catching proclivities of our Party Politicians, as almost to exclude any thought of the National welfare which might have been attained by producing at home an amount of food greater in value than any profit we have ever made by the export of manufactured goods ?

The following pages will not have been written in vain if they induce even a very small number of Town Voters to use their influence at the Polls to elect Members of Parliament pledged—not in the Parliamentary sense, but as honourable men—to the steady and continuous consideration of the development of British Agriculture, instead of devoting their exclusive attention to the transient froth of the politics of the day.

When the factory worker realizes that, even if the factories get enough orders to keep them fully employed, the United Kingdom will still not have enough money in future to purchase all the Raw Materials we should need to import, as well as all the food-stuffs which we do not grow, he will appreciate the fact that he must bring the weight of his vote to bear in favour of intensive Home Agricultural Production. This must be done in order that the Kingdom may be

able, at a reasonable rate of Exchange, to pay for the cotton, copper, tin, iron, rubber, oils, jute and other articles required in the factories, which we must, in any case, get from abroad, because they cannot be produced at home.

The present time, when British Farming is again approaching its lowest ebb, seems a suitable occasion to call attention to the whole Nation's interest in the subject of Agriculture from this new standpoint. The following pages are, therefore, written with the hope that they may enlighten, not particularly the landlord, the tenant farmer or the agricultural labourer, but that much greater portion of the Nation, the town dwellers, who are even more affected by the results of National Agriculture than are those who get their living from it, no matter how the Nation may suffer owing to the small total production from home-grown crops.

The increase of home production from our own soil and from our own Raw Materials is a far more important question to the factory worker, to the town and suburban dweller, and to the professional and City man, than any of them have yet appreciated. Most of those who read their newspapers, or discuss other than personal problems with their friends and neighbours, have given a portion of their thoughts in the past to "Manufacturing Output," "Foreign Markets," "Transport Questions" in this Country, "Coal Production," "Shipping Problems," "Foreign Policy" and the wrangles which go on between politicians in and out of Parliament, but how many of those who read these pages have given even an occasional

half-an-hour's thought to the Nation's interest in Agriculture ?

These Chapters are devoted to showing the Town Dweller how the prosperity of this Country can be regained ; how the income of the professional men, the income of those who work with their heads, and the wages of those who work with their hands, can be maintained.

The data given all the way through the pages are taken from official sources and the figures may be accepted as actual, within the limits of small clerical errors. The arguments will all through be based on the figures of the last normal pre-war year of 1913, or the average of a few years prior to that date.

Some of the arguments may be controversial, but none of the principles involved can be objected to, either by Free Trader or Protectionist. Certain facts in our economic life are presented from a new standpoint which may, in the first instance, cause some degree of criticism. It will only be fair, however, that criticism should be deferred until all the facts dealt with have been duly considered. In other words, when you have read this Chapter, please do not put down the book in the belief that you know all about the subject, or that it is one that is beyond your comprehension.

The book is written by one who has, for twenty years, made a continuous and exhaustive practical study of the subject from the National point of view. It is written throughout without the use of technical expressions, and it is hoped that it may make the position clear to those who, before, have had little or

no knowledge of the subject. Inasmuch as it gets very near to nature, it should be of interest to any thinking person who wishes to know simple facts in regard to the greatest of all mundane affairs.

The problems discussed are as all-important to the factory worker as they are to those who are engaged in the pursuit of Agriculture. These problems themselves would, sooner or later, be thrust upon the attention of everyone in this island, through poverty and hunger. The object of these pages is to spread abroad now such an amount of knowledge, that a great body of opinion may be rapidly educated to insist, at an early date, upon such an improvement of agricultural methods and conditions as will bring back to this Country its past prosperity, and keep its inhabitants in modest wealth and truer comfort than they have ever known.

It is the endeavour to show that by producing, within the Kingdom, the bulk of the food and other products of the soil, making up the £300,000,000 worth of such imports we have been in the habit of getting from abroad before the War, we can find work for a large portion of the unemployed, and, at the same time, we can reverse our trade balance abroad, so that we shall be in a position to pay for the Raw Materials needed for the goods, which we want to manufacture for ourselves, as well as for exports to those foreign markets which we can still reasonably hope to maintain.

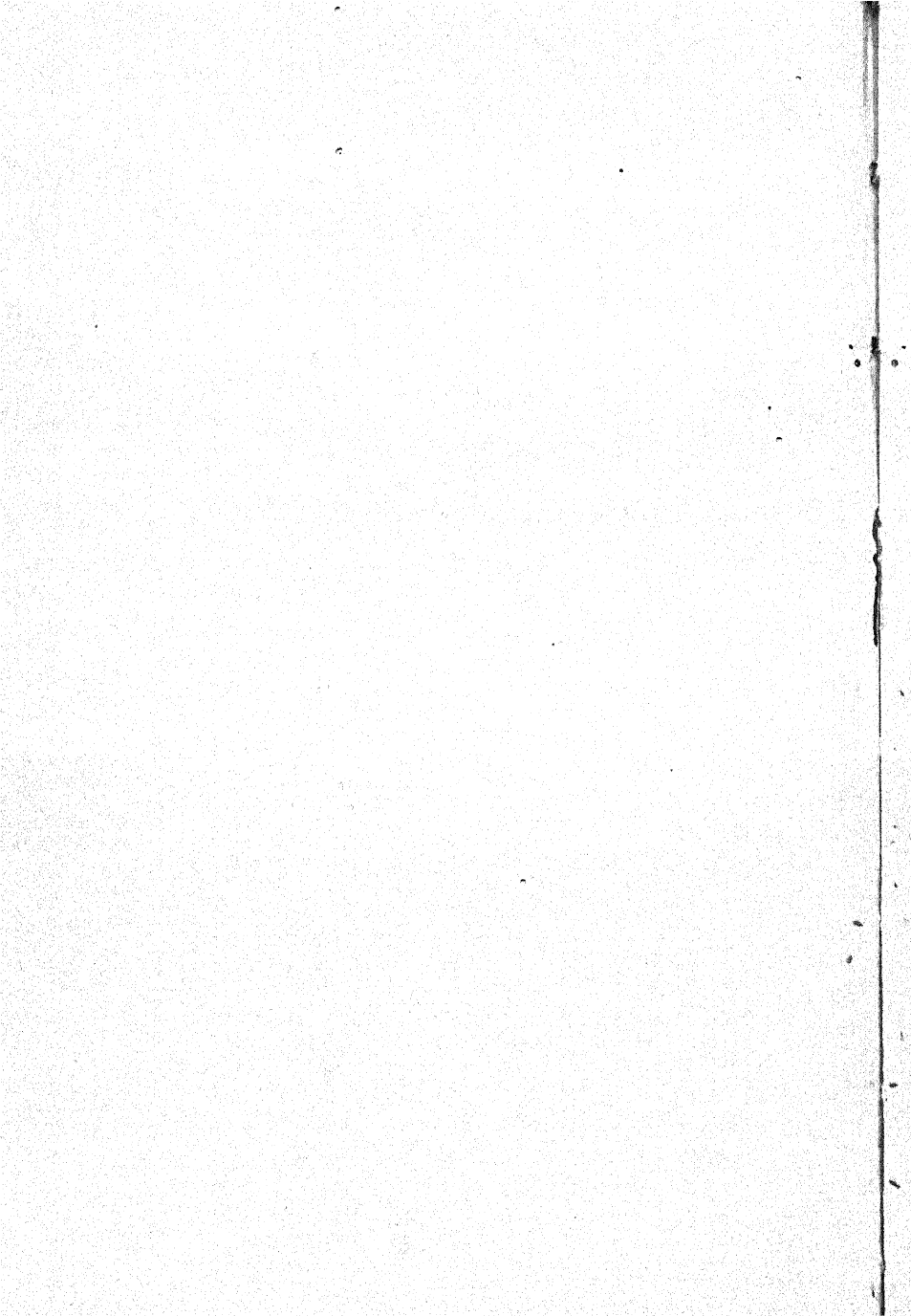
For safety, in the matter of food supply and as a set off against the loss of part of our past export trade, it seems suicidal not to reduce our Imports of things

which, by proper organization, we can perfectly well produce ourselves, without loss to anyone.

During the War, the Food Production Department's Campaign enabled the Country to increase its home production of food by nearly one-third, thus releasing the amount of shipping required for bringing over 500,000 American troops and their entire equipment, at the critical moment, which, in turn, enabled us to win the War. The object of these pages is to show that, by further effort, not quite in the same direction as that followed out during the War, we can produce at home practically the whole of our food requirements. We have the area; we have the good land; we have the suitable climate; we have ample population and, after we get into full swing, we can produce as cheaply as other countries. All that is needed is the enterprise, organization, goodwill, work and inducement to get such a production from our own soil, that this island will be independent of other nations, safe against submarines, and with a foreign trade balance in its favour. The money not sent abroad for food will all circulate here, and will enable all branches of industry to pay good wages, and guarantee to the producers—whether they be of farm or factory—to the necessary middle men, and to the professional men, reasonable incomes and a peaceful existence.

CHAPTER II

FUNDAMENTAL AGRICULTURAL FACTS



THE experienced farmer and the student of Scientific Agriculture will probably find little in this Chapter which he does not already know, but it contains the fundamental physical and chemical facts, which have the greatest bearing on productive Agriculture, and as these can all be expressed in simple language, every person—be he town or country dweller—who desires to understand the bearing which Agriculture has upon the Nation's future, should have these facts within his knowledge to appreciate the problems which arise in the production of substantial crops.

A great deal of the data given may be considered elementary by those who have studied the subject, but since this book is intended for the enlightenment of the general public, and especially for the town dweller, it seems of advantage to give it.

Soil is essential for crop production. Original igneous rocks, or even undecomposed aqueous rocks, such as Old Red Sandstone, Oolite, Limestone and Chalk, will not produce crops. Soils are the result of the decomposition and weathering of original rocks, which rocks have usually been disintegrated at their surface by the action of air, frost, chemical re-actions, root penetration, and the result of animal and worm movements in soil. Worms may not seem important

to the lay mind, but when it is realized that they bring up to the surface on each acre of an ordinary field some 10 tons per annum of fresh soil, which before that had been largely unproductive, their usefulness will be appreciated. The holes they make also help to aerate the soil and assist drainage.

In the United Kingdom there exist samples of nearly every geological formation, and, therefore, there are a large variety of soils, as the decomposition of each kind of rock gives a somewhat different soil, and while practically every one of our soils, when deep enough, will grow wheat and other cereals, some are rather more suitable than others for certain crops. Geology has, therefore, some, though comparatively not a very important, bearing on British Agriculture. The Alluvial soils are, however, in most cases decidedly better than most of the others, but even the Cambrian and Silurian clays can be made productive, by proper draining and suitable ploughing and cultivation.

The following short summary of the chief *Geological* Formations, or periods, that bear on British Agriculture, in their order of formation, will be of interest.

The Old Red Sandstone has produced some valuable agricultural land. The original rocks have crumbled into soil of good quality, as in parts of Devon, Cornwall, Herefordshire and Forfar. Where, however, the formation is harder and more silicious than usual, the agricultural value of the soil is not of the best.

In the Carboniferous system, the shales often produce stiff and wet clay soil, which is expensive to work and requires the artificial addition of Lime and a great

deal of perseverance, but, when properly treated, the soil from most of the beds in this system are made productive.

The New Red Sandstone in England has disintegrated into soil of very good productive capacity. It is usually easily worked and gives up its chemical constituents readily to the roots of the plant.

The Liassic system contains a good deal of cold clay soil, of which much has already been converted into productive wheat land, through drainage and proper attention.

The Oolitic system, which forms a broad band reaching from East Yorkshire, through Lincolnshire, Bedfordshire, Oxfordshire, and Somerset, contains most prolific soils, especially where Lime happens to be in plenty. Those parts which have been left undrained in the clays require plenty of cultivation work. At present, a great deal of such clay lands in the Counties of Bedfordshire, Oxfordshire, Wiltshire, and Somerset, are not being worked with the object of producing large crops, and in comparison with the well-tilled, well-drained, well-cultivated and ploughed soils of other Counties, part of their area may almost be described as in a prairie state.

The Wealden Clay and Greensand of Kent, Surrey and Sussex, is also a soil that requires drainage and cultivation. When properly dealt with, it produces forty bushels of wheat, but, without energy and enterprise, a good deal of it is left in only a semi-productive condition.

Chalk, forming the subsoil of the broad strata of the Cretaceous system, will not in itself grow crops, but it is nearly always covered with either a thin soil, which produces the sweet down pasture, or by beds of clay and marl, which give first-rate cereal and root crops. Parts of Norfolk, Suffolk, Cambridgeshire, Hertfordshire, and the north part of Kent, are chalk districts of good agricultural value.

The Tertiary and systems of recent Alluvial formation are amongst the largest producing soils of the British Isles at present, chiefly because they are easily worked. In the latest geological formations, viz., the rich Alluvials of, for instance, Lincolnshire, Cambridgeshire, and parts of other counties, they have stores of plant food much in excess of the other farm lands of the Kingdom.

In each system or formation, the soils above rocks of the same geological age are very much of the same agricultural character. A geological map is, therefore, some guide as to the kind of agriculture which can be practised to best advantage.

* * * * *

Physically, soils may be divided into three main descriptions, viz. :

1. Sandy Soils.
2. Loamy Soils.
3. Clay Soils.

Experts divide these into half a dozen subdivisions. A Sandy Soil is not all sand, any more than a Clay Soil is all clay, and a Sandy Soil may be described

as a soil in which sand and loam and a very small quantity of clay are usually mixed. A Loam Soil usually contains a little sand, a large portion of Loam, some silts, and up to about 30% of clay. A Clay Soil may be divided into light Clay Soil and heavy Clay Soil. A light Clay soil contains an appreciable amount of grit with a large amount of silt and a considerable amount of clay. In a heavy Clay Soil there is hardly any grit, some silt and a larger proportion, that is well over 50% of clay.

A soil that is made up of nearly all clay need hardly be mentioned, because such a relatively small area of it exists as to be negligible, but when it does occur, it is useless for agricultural purposes.

Another description of soils by name would be to use the expressions Sandy Soil, Sandy Loam, Loam, Clay Loam and Clay Soil.

The physical properties of soil that count in Agriculture are porosity, density, water retaining capacity, and the capacity for retention of temperature. Plants live entirely upon the materials they obtain from the air and from chemical ingredients and moisture in the soil. Therefore the soil must be porous to let in the air and moisture, and sufficiently dense to retain moisture, and yet not too dense to give the roots of the plant their channels for finding and collecting water and the chemicals which form their nourishment.

There are about 40,000 tons of air over each acre of land, and the air contains 78% Nitrogen, 21% Oxygen, the remainder including Carbonic Acid Gas, Argon, etc.

The plant gets the food for its entire growth through its leaves and through its roots.

As we are dealing with the soil first, it is well to explain that the root hairs of the plant, forcing their way amongst the various particles of the soil, drink up and absorb the moisture in the soil. Any soil, either naturally fertile, or which has been made so artificially, contains the necessary chemical ingredients for plant growth. When it is realized that a cubic inch of heavy clay soil contains about 10,000 particles, while a cubic inch of sandy soil contains 1,000 particles, it will be understood that a happy admixture of clay and sand, or silt, makes the best hunting ground for the plant's rootlets, as the all-sand is so coarse that it does not hold sufficient moisture, or give enough surface, and the very heavy clay is so dense, that the roots find difficulty in forcing their way about in it.

In regard to moisture, various crops need different quantities, but taking wheat as the most important crop, and as typical of the other cereals, it is well to realize that a fairly good crop of wheat grown on an acre of ground must obtain from that acre about 1,000 tons of water during the course of the crop's growth. This water is taken in by the rootlets and is evaporated out of the leaves. A thousand tons of water to the acre represents about a rainfall of 10 inches. Therefore, it is necessary to keep the soil in such a condition that not much more than about half the normal English rainfall is lost by draining away, or by direct soil evaporation.

At the same time, too much water must not remain in the soil because, when it is waterlogged :

1. Air cannot get in to oxidize its contents into available plant foods, and,
2. The solutions of food become too weak for the plant to absorb enough sustenance.

A plant that has to take in and evaporate an excessive quantity of water that is very weak in plant foods, keeps the temperature of the leaves and stem at such a low heat that when sunshine appears the chemical changes of the solutions in the plant —on which its growth depends—are insufficiently rapid.

Good drainage of soil is, therefore, necessary, especially in the heavier loams and the clay soils. The drainage out of the soil of excess water sucks in the air, that is, compels it to penetrate between the soil particles.

The humus, vegetable matter, chemical salts, in the soils can only become valuable when the soil is not water-logged. As heavy clays retain three times as much water as do sandy soils, containing sometimes up to 50% of water, it is essential for the production of large crops that heavy clays should receive artificial help towards their drainage, where noticeably water-logged and wanting in fertility.

Drainage is also necessary from the point of view of making heavy clays less cold, much of the sun's heat being consumed in evaporating the excess water through the surface of the soil. A dry soil is sometimes 20 degrees warmer than the shade temperature of

the air. A wet heavy clay is much colder than a dry soil, and in the spring its crops are often a fortnight later in developing than on a neighbouring well-drained field, and this fortnight may be everything in the final growth and yield of the plant.

Capillary action of water in soils is also an essential to plant growth. Unlike wheat, the roots of barley, for instance, only penetrate a very few inches into the soil, but this plant, like others, must have moisture. Fortunately, there is a strong tendency in the stored water to rise gradually in films round the soil particles, towards the surface by what is known as capillary attraction, and by this means water, from a depth of even 18 inches, comes gradually up to the roots of the plant.

In order to avoid an excessive loss by evaporation at the surface of the soil itself, and not through the plant, the farmer, for a great many of his crops, keeps what may be called a "blanket" or "mulch," of open crumbs of soil for an inch or two on the surface of his fields, or gardens, as through such loose particles the capillary film waters cannot ascend to the surface and evaporate.

The chemical contents of soils, of course, play a leading part in the plant's growth, and while only about four chemical substances require detailed consideration, and this because of their shortage in soils, yet it may be well here to name the chief chemical elements used by plants, with their symbols, which the reader may very easily remember :

Name of Chemical Element.	Symbol.
Oxygen.....	O
Carbon	C
Phosphorus	P
Nitrogen.....	N
Hydrogen.....	H
Calcium (Lime)	Ca
Potassium	K
Sodium.....	Na
Sulphur	S
Chlorine	Cl
Iron	Fe
Silicon	Si
Aluminium	Al

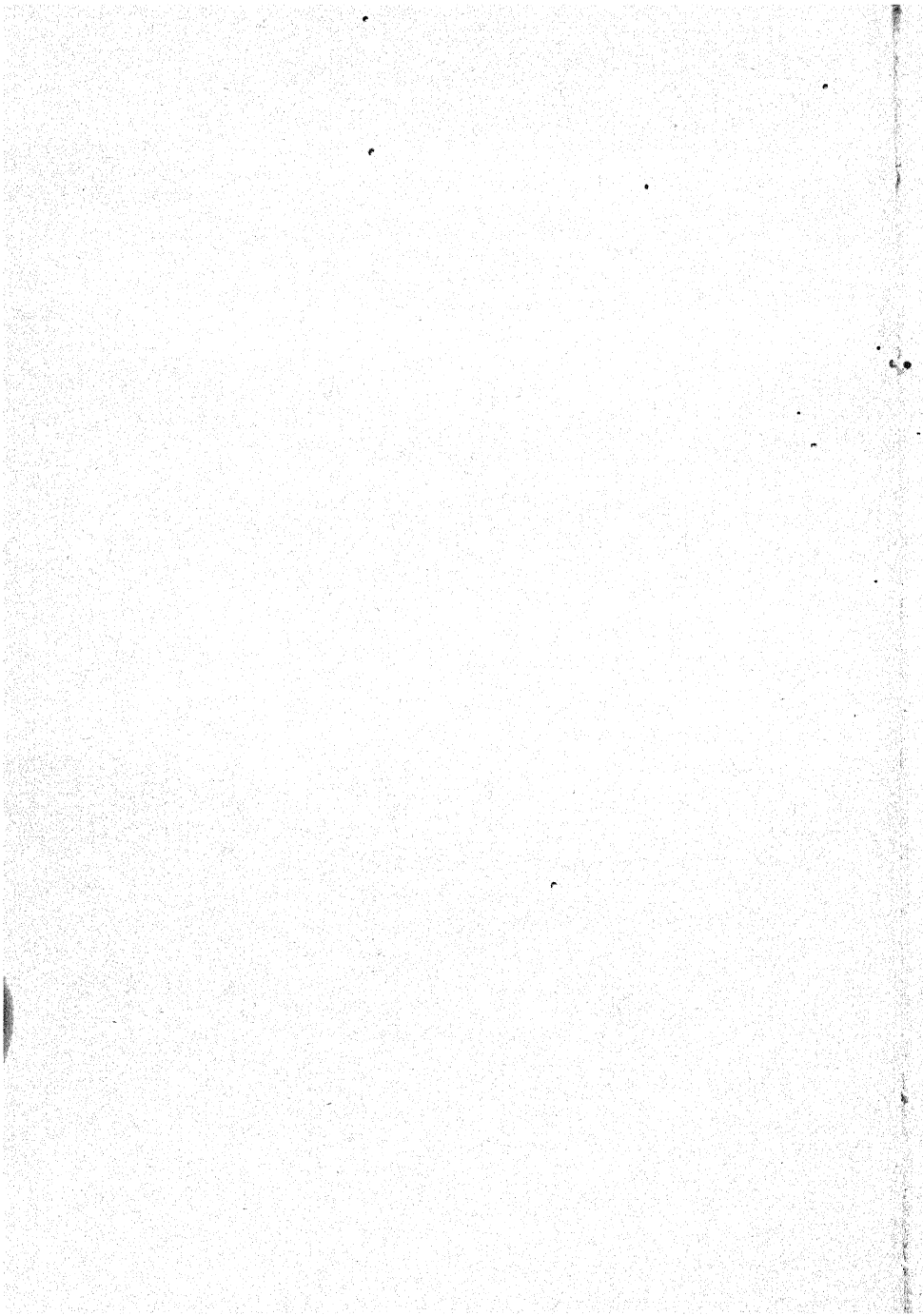
It is proposed to eliminate most of these chemical elements from further discussion, as all soils, or the air over them, contain a sufficiency of nearly all of them to give the plant what it requires of each kind of food, the exceptions being Phosphorus, Nitrogen, Lime (Ca) and Potash, and these are placed in order of their relative importance from the scientific farmer's point of view.

Dealing still with soils, it may be convenient to give the following partial analyses of certain typical, fairly fertile, agricultural soils :

TABLE II

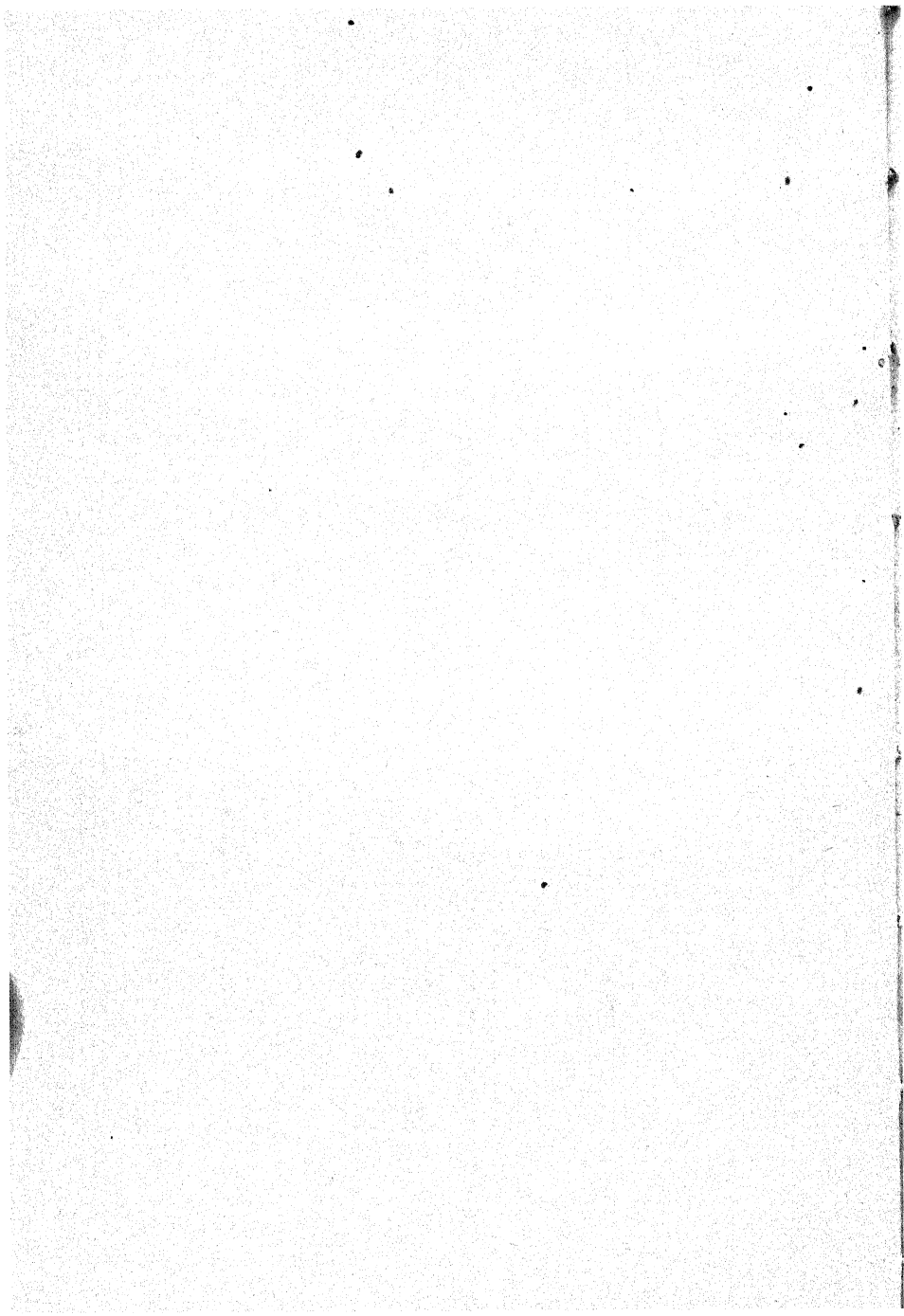
CHEMICAL COMPOSITION OF SOME TYPICAL AGRICULTURAL SOILS

	%	%	%	%
Silica.....	61.20	80.00	63.7	81.26
Alumina	14.04	5.2	20.4	3.58
Peroxide of Iron	4.88	2.68	3.0	3.41
Lime .....	.83	2.16	4.3	1.28
Magnesia	1.02	.55	2.7	1.12
Potash	2.80	.29	2.9	.80
Soda	1.44	.25		1.20
Sulphuric Acid .....	.10	.03	.10	.10
Phosphoric Acid .....	.24	.24	.15	.38
Organic and Volatile Matter	8.55	8.12	2.8	5.66
Water	2.70	3.36		



CHAPTER III

FUNDAMENTAL FACTS CONTINUED—PLANT FOODS



THE following Table of the chemical composition of a crop of wheat and its straw may be taken as an illustration of what plants have to obtain for their full growth :

TABLE III
COMPOSITION OF WHEAT (GRAIN AND STRAW)
In 100 parts

Carbon	47.69	} 93.55%, derived from air and rain.
Hydrogen.....	5.54	
Oxygen.....	40.32	
Soda	0.09	} 3.386%, with which the soil is usually well provided and which do not need to be added, except in unusual cases.
Magnesia	0.20	
Sulphuric Acid	0.31	
Chlorine	0.03	
Iron Oxide.....	0.006	
Silica.....	2.75	} 3.00%, with which the soil is provided only to a limited extent and which require to be added as a fertilizer, or in the case of Nitrogen by Bacteria fixation.
Nitrogen.....	1.60	
Phosphoric Acid	0.45	
Potash	0.66	
Lime	0.29	

Plants obtain food for their growth and development in the following manner, taking wheat as an example. The seed, usually sown in the autumn, germinates in moist soil within a few days, and soon sends down three rootlets. These directly begin drawing moisture from the soil into the plant, and the first stem pushes its way to the surface. The upward pressure of the stem as it grows is enormous, and it can

break through a comparatively hard surface. The stems, as they grow, serve, not only as valuable stiffening to support the leaves and ears, but also act as the pipe for the circulation of water and food saps. After the first roots are established, more roots are thrown out, and, during the late autumn and winter, a very complete underground root system is developed, and other branches and stalks, emanating from the same parent grain, are formed for the next year's crop, always provided the rootlets can obtain nourishment for the plant.

Soil waters practically always contain in solution sufficient Silica, Iron and Magnesia, and usually ample Potash for cereal growing. They contain some Phosphoric Acid, Lime and Nitrogen. In the autumn, Nitrates, which are the only form of Nitrogen the plant can use, are generally available in the soil, because, during the summer, Nitrates are produced from Humus, Bacteria, and other materials in the soil. The Nitrates not used up by the wheat and other plants in the autumn and early winter are largely washed away by the winter rains, and a good crop of wheat, and of most other plants, depends upon a fresh manufacture of Nitrates from the above substances in the soil, or from artificial dressings of Nitrates in the spring.

Regarding Phosphoric Acid, which is really the key to the future human life and increase of population of the world, it is supplied to the soil waters very slowly from the store of it which exists in most soils, but which is largely insoluble and combined with the soil particles. The roots of wheat and other plants,

however, by chemical processes, involving the use of Carbonic Acid from the air and Carbonate of Lime from the soil, do gradually render available for plant food some of the soil Phosphoric Acid. On many soils, however, the rate at which the soluble Phosphoric Acid becomes available for the plant is so slow that only small crops of grain can be obtained. For this reason, practically every soil has to be supplied with Phosphoric Acid, either by treating the land with farmyard manure, or by dressings of Superphosphate or Basic Slag.

While the plant roots are taking in enormous quantities of water, containing very dilute mineral plant foods and Nitrogen, the leaves are breathing in Carbonic Acid Gas and Oxygen through thousands of minute openings which exist chiefly on their lower surface. The leaves are also giving off to the air, in the form of vapour, the moisture that has been taken in through the roots, after it has given up to the plant the foods it contained. The quantity of water given off is regulated by glands on the leaf openings, which permit only surplus water being given off by the plant.

The foods obtained through the roots and the Carbonic Acid Gas admitted through the leaves, together perform a most wonderful and intricate chemical combination and manufactory within the leaves of the plant. This is started—as yeast starts fermentation in bread-making—by a green coloured matter known as Chlorophyl.

The products Starch, Sugar, other Carbohydrates, Proteins, etc., are formed by these chemical

processes, and, after supplying the leaf with its necessities for growth, they pass into the building up of additional stalk and leaves, and gradually get into the seed-bearing part of the Wheat, i.e., in wheat, the ear, which shelters the grain. Finally, while leaving the Silica, Iron and traces of other materials in the withered leaves and dried-up stalk, the above-mentioned products concentrate to form the valuable part, that is, the grain of the plant.

The final grain or seed, when complete, is like the egg of the chicken, it contains not only the germ of the future plant, but all the necessary food to start and continue its growth, until the roots and leaves are able to feed it.

* * * * *

A crop of wheat, from one acre of land, has, by harvest time, taken out of the soil about 5,000 lb. in weight of materials, in addition to about 1,000 tons of water, which latter it has pumped through its roots, stalks and leaves and has evaporated into the air. If the Carbon, Hydrogen and Oxygen, which form the greater part of the weight of the harvested grain and straw, are eliminated, the remainder from one acre of crop will be found to contain about :

	lb.
Soda	2.6
Magnesia	7
Sulphur	15
Chlorine	2
Silica.....	97
Phosphoric Acid	21
Potash	29
Lime	9
Nitrogen.....	50

There are about 10,000 grains of wheat in 1 lb., about 60 lb. in a bushel, 8 bushels in a quarter. This last measure has been the usual quantity quoted for sale of cereals in this country, but a hundred-weight of 112 lbs. has now become the legal standard.

The average consumption of wheat per head of population in the United Kingdom is slightly under 6 bushels a year.

The ultimate object of all Agriculture is to feed human beings. The system of Agriculture practised in Great Britain, at present, produces, from all the farms, under 2,000,000 tons of grain used for direct human food, of a value of less than £20,000,000. In addition 4,000,000 tons of potatoes are grown which, at pre-war prices, amounted to about £10,000,000 in value.

About 56,000,000 tons of oats, barley, roots, hay and other crops were, according to the last Census, grown on the farms, the value of which was £98,000,000, and all of which were used for feeding animals. These animals were to provide meat, etc., and produced a value of £64,000,000 in meat, while the dairy and poultry produce was valued at £35,000,000.

In order to grow 1 lb. of beef, 13 lb. of dry food is used by an ox. A sheep produces 1 lb. of mutton from 9 lb. of dry food, while a pig produces 1 lb. of pork with a consumption of only $4\frac{1}{2}$ lb. of the same value food. It will be seen that there is ample room for the feeding of humans by a more direct method of farm agriculture than that at present practised.

Small holders and, market gardeners also have ample room to extend in order to be able to supply £6,000,000 worth of Fruit and Flowers now imported, and £33,000,000 Dairy Produce and £10,000,000 Eggs and Poultry we get from abroad.

The food consumption of the United Kingdom, of home-grown and imported foods together, was carefully tabulated by a Committee of the Royal Society, at the request of the Government during the War, and the summary of their figures, converted by them into Energy Value, i.e., Millions of Calories, was as follows :

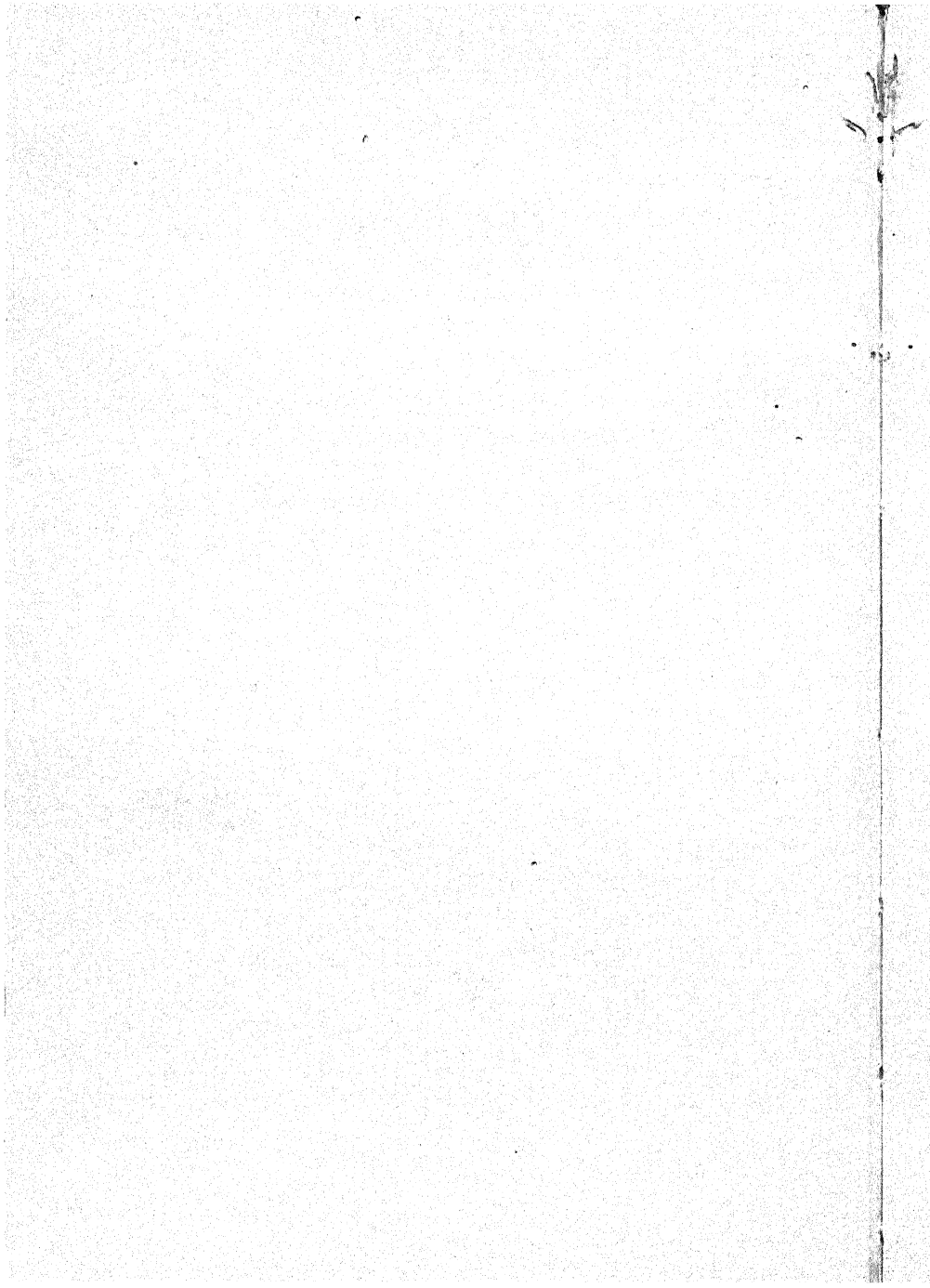
TABLE IV

	Energy Value. Millions of Calories.		Total Energy Value Consumed. Millions of Calories.
	Home Produce.	Imported.	
Cereals	3,705,000	14,007,000	17,712,000
Meat	5,369,000	3,521,000	8,890,000
Poultry and eggs, game and rabbits	235,000	226,000	461,000
Fish	392,000	139,000	531,000
Dairy produce (in- cluding lard and margarine)	4,715,000	3,538,000	8,253,000
Fruit	168,000	909,000	1,077,000
Potatoes and other vegetables	4,054,000	758,000	4,812,000
Sugar, including cocoa and choco- late	—	6,633,000	6,633,000
Cottage and farm produce not in- cluded above	2,655,000	—	2,655,000
	21,293,000	29,731,000	51,024,000

It will be seen that, if we even produce all our own cereals and sugar (omitting for the moment meat and dairy produce imported), we should get from home soil an additional 20,640,000, which, together with our present production, would give us 41,933,000 out of 51,024,000 millions of Calories needed for food by our population. That is to say, instead of at present producing 41%, we should, by producing all our requirements of cereals and sugar alone, even without increasing meat and milk, produce 82% of our requirements.

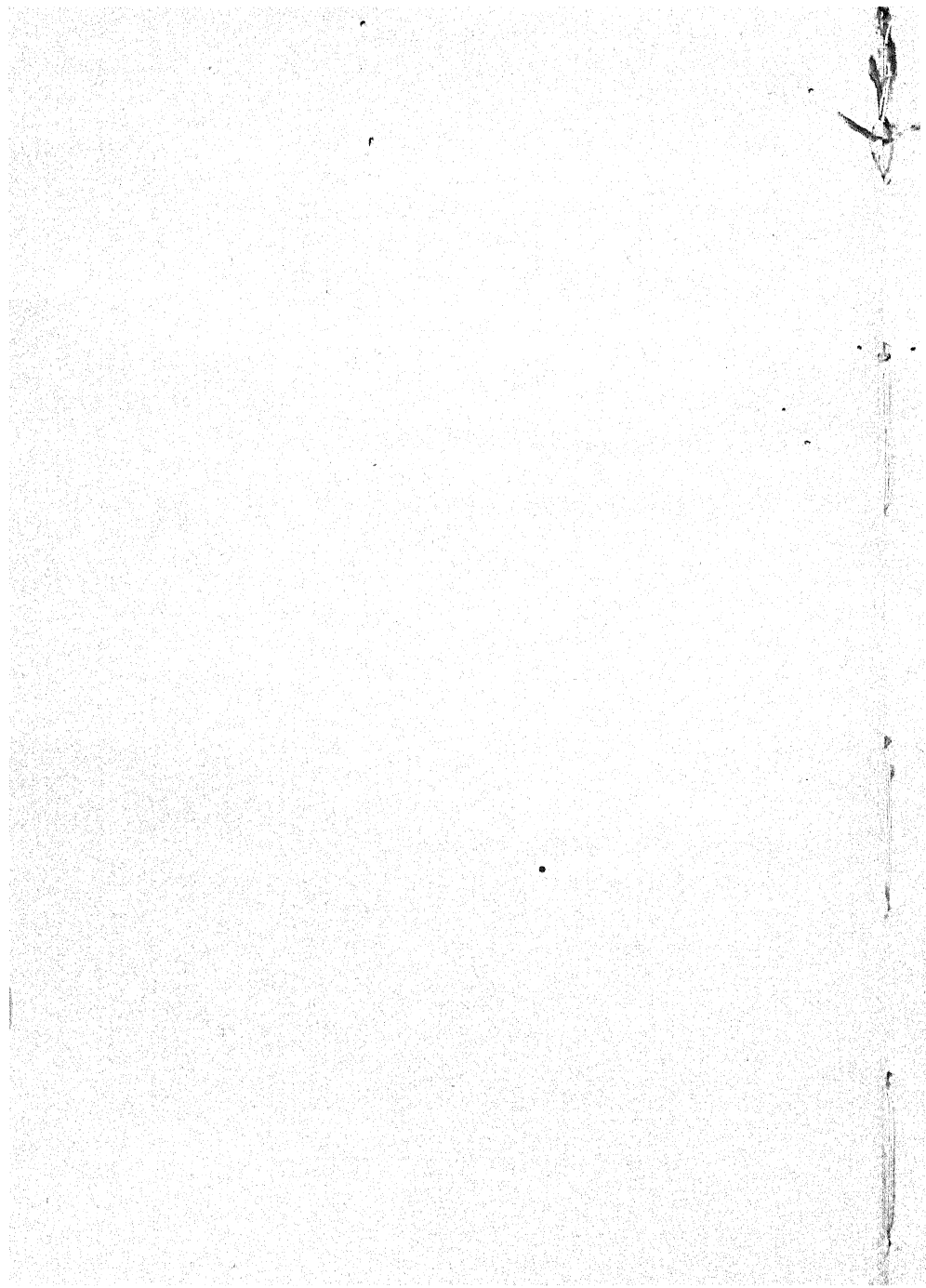
By extra ploughing and more intensive cropping, the additional meat and milk to make up the 100% of our needs would also be grown at home.

The number of Calories used on the average, per head of our population, per day, is 3,091, and it is calculated that a man doing manual work uses 4,000 a day.



CHAPTER IV

AIDS TO INCREASED FERTILITY



BEFORE considering the increased crops obtained from applications of farmyard manure and artificial fertilizers, it is well to discuss the improvements of the soil, and, therefore, of the output, that come about from mechanical means which aid the chemical re-actions and improvements that take place in the soil.

Cultivating, ploughing, stirring, harrowing and rolling are chiefly carried out for the following reasons :

The breaking up and movement of the soil, allow air to penetrate, thus helping the decomposition in the soil of those materials, which, by aeration, render the plant food soluble, or available, for its nourishment. These operations also tend to break up soil into particles of sufficient fineness to allow the plant roots to penetrate. Incidentally, they also turn down into the soil weeds, which are thus killed, and stubble or farmyard manures placed on the surface. All of these are, by ploughing, conveyed below the surface and, under the name of "Humus," become the receptacles for storing what will eventually give Nitrogen, and, to some extent, Phosphoric Acid and Potash in the soil.

In addition, these stirring operations break up the surface soil into a state of fineness to encircle the small seeds with earth, moisture, warmth, and

start them on their growth. This fineness, or top "tilth" of the soil acts also as a receptacle for moisture from rain. By reason of its fineness, it is an insulator, or blanket, preventing an excessive surface evaporation of the water contained in the lower soil. The fineness and openness of the top inch or two thus act as a check to capillary action.

Sandy soils and loams are comparatively easy to manipulate with plough, cultivator, harrow and roll, and although, when properly prepared, the Clay soils frequently give larger yields of cereals and cattle food, yet the difficulty and, therefore, costliness of handling, stirring and breaking up the clays sufficiently for proper aeration and preparation of a good "tilth," have been very much against Clay soils in the past. Air must circulate freely in the soil to supply air to Bacteria.

In very wet weather, sometimes for two or three months in the winter, Clays cannot be satisfactorily worked with the plough or other instruments, and the horses are kept idle, adding to the expense of working and the necessity of keeping a larger stock of horses for preparing the Clay soils in the shorter period available, before the season for sowing the next crop.

Drainage is also an additional expense which has to be incurred in connection with many of the heavier Clay areas. A great deal of the clay that has gone down to grass in the last forty years was formerly drained, when growing cereals, by a special means of surface ploughing, which left the fields with a corrugated appearance. Deeper drainage by earthen-

ware pipes, placed end to end, but with a space for the water to enter between the ends, has also been very largely practised, but not nearly sufficiently in the Clay areas. Mole plough draining, a cheaper form of underground drain, has also been used with advantage, but in many areas still to be brought under the plough, the expense of draining must be incurred, as even a semi-waterlogged soil seriously impedes fertility.

Very few really good farmers will claim that they could not, in the past, have got considerably better outputs for their crops, had they ploughed, cultivated and stirred their ground more. They will say, however, that the prices obtained did not justify keeping extra horses all the year to do this work which could only be carried out during two or three critical months.

Lime. The application of Lime to many soils is of the greatest importance in practical Agriculture. It gives direct food to the plant, which requires Lime for its growth. Lime neutralizes such acid substances as are formed in the soil, and removes what is called "sourness." It helps to make Nitrogen into a Nitrate and, therefore, available as plant food. It helps to make Phosphoric Acid in the soil into that form of Phosphate upon which the plant feeds. It also frees Potash.

Lime also has a mechanical effect in helping to split up tenacious clays into a more easily worked form of soil. It is not looked upon as a manure in itself, but as a channel, or agent, through which the

more scarce plant foods are got into a condition in which alone they are taken up by the plant roots, both in plough land and on grasses.

The clay land farmer, especially when breaking up pastures, should always have Lime before him as a probable need for his soil, and, in many cases, it should be applied every four to six years.

Powdered Lime is naturally the best form of application, on account of its fineness and state of immediate availability. Very finely crushed chalk, or crushed Limestone, may be used, but in either of these applications about twice-and-a-half the quantity is needed as compared with Lime, but the larger quantity avoids the necessity of such frequent applications.

Manures and Fertilizers. Turning now to the application of direct fertilizing materials, the only substances that need be dealt with are Nitrogen, Phosphoric Acid and Potash, because, as already explained, all the other constituents of plant growth are readily obtained from the air, or occur in the soil in more than sufficient quantities.

Farmyard manure and stable dung come first on the list of fertilizing materials. They contain not only large quantities of Nitrogen, Phosphoric Acid and Potash, but also have a distinctly beneficial effect upon the mechanical working of the soil. Their fertilizing ingredients are largely stored in the Humus they introduce into the soil in forms that are not immediately available for the plant food. In fact, while obviously good results are obtained

in the first, second and even third year after the application of a heavy coating, yet it is not known for how many years after first putting on dung, the contents are, to some extent, gradually becoming soluble and some of the plant foods are still being obtained by succeeding crops.

Some Agricultural Scholars believe that the practice of making farmyard manure, largely for the purpose of fertilizing the soil, will be considered uneconomic in the near future, partly because of the mechanical losses, and partly because only one-third of the Nitrogen is in the solids of the manure; the whole of the Phosphoric Acid, however, being practically in the solid, this is naturally the more easily saved part of the manure.

To-day's practice is to add Cake to the feeding of cattle, not only for their fattening, or to help milk production, but also in the belief that, by so doing, fertilizers are added economically to the soil in the dung, whereas for the reasons just stated, it would be more economical and efficient to add the fertilizers direct to the land in the form of chemical dressings.

There is little doubt that, in the days of low-priced meat and milk, were it not for the mechanical improvement of the soil through the Humus introduced by farmyard manure, and the storing capacity of fertilizers in the Humus, that plant foods could be more economically introduced by purchasing Nitrate of Soda and Superphosphate, than by feeding cattle to produce manure.

As things are, however, at present, the first

fertilizer from every point of view is farmyard manure, and it should be used to the utmost of its production.

The Scientific Agriculturists of this, and to a large extent of other countries, have, of necessity, had to depend upon the results of the Rothamsted Experimental Station for data on fertilization trials extending over a long period of years. It is, therefore, quite natural that Nitrogen should, in all their thoughts and writings, be the most important food with which plants have to be supplied.

Rothamsted was established more than seventy years ago by Gilbert and Lawes, who have done more than anyone to deserve the gratitude of the agriculturists of this country and the world over. At the same time, it should be realized that the bulk of their experimental plots and the theories they were established to demonstrate, were rather based on Nitrogen than on other plant foods. Agricultural Scientists now believe that the addition of other fertilizers to the soil are equally, if not more, needed than Nitrogen for economical crop production.

It is true that Phosphoric Acid and Potash were introduced in many of the early Rothamsted experiments, but not so much with a view of testing the quantity of each that might be needed, as to observe Nitrogen under all its conditions, and sometimes in the presence of an excessive amount of the other two chief ingredients.

The experiments at Rothamsted and elsewhere, and the practice the world over, have demonstrated, however, that, except in regard to cotton, tobacco

and of potato growing on some soils, and of a few exceptional crops, which may be ignored, the artificial addition of Potash is not a material factor in the future advance of Agriculture of Great Britain. During the War, for instance, when no Potash at all was available, its absence was practically unnoticed in this country. It is, therefore, not proposed to discuss Potash in this economic treatise.

In regard, however, to Nitrogen, past systems of Agriculture undoubtedly made it necessary to supply Nitrates artificially to obtain large crops. This was either done by putting on in the spring a small dose of Nitrate of Soda imported from Chili (15% of Nitrogen), all of which was immediately available for plant growth and any remnants of which would be washed out of the soil in the next abundant winter's rain.

Sulphate of Ammonia, a product from the cleaning of gas from coal, containing 20% of Nitrogen, is also a valuable manure, but it is not so immediately available, as its Nitrogen has to be converted in the soil into a Nitrate before the plant can use it. This is only a question, however, of a week or two.

Other forms of nitrogenous manures are being obtained by the artificial separation of Nitrogen from the air by means of very high electric currents, the formation of Nitrate of Lime being a usual means of stabilizing and fixing the Nitrogen thus obtained.

A certain amount of Nitrogen is brought into the soil in the rain. It is estimated that this amounts

to about 5 lb. per acre per annum. Each wheat crop, however, takes 50 lb. of Nitrogen out of the soil, and it has been estimated that a further 25 to 50 lb. is lost each year in drainage waters.

During the last twenty years, the fixation of Nitrogen in the soil itself by Bacteria attaching themselves to the roots of certain leguminous and other plants, has been observed, examined and developed. A Red Clover crop is said by some observers to produce not only the Nitrogen it needs for its own growth, but to leave from 50 to 100 lb. an acre of excess Nitrogen in and about its roots in a form which, while it will not wash out in the first winter's rain, will, during the next spring and summer, be rendered available for the plant food of the succeeding crop. Clover, Lucerne, Lupins, Tares and Vetches are the richest fixers of Nitrogen in the soil, but fortunately, Peas and Beans also, though to a lesser extent, are Nitrogen fixers. This question will be more fully dealt with in a later Chapter.

Another method of fertilizing is green manuring, by which is meant the growing—generally in the early autumn—of a rapidly growing crop, such as Mustard, Rye, Buckwheat, or such Nitrogen gathering plants as Tares, Vetch, Horse Beans or Lupins, then ploughing the crop into the ground while it is in a green stage. The object of this is to get Humus into the soil, and to store Nitrogen in green stalks and leaves, which would otherwise wash away in winter. Green manuring improves the texture of the soil, and a heavy crop, like Mustard, grown rapidly after the removal of, say, Wheat

in autumn, serves the above purposes, as well as by getting rid of weeds by smothering them.

Phosphoric Acid, which is an essential in the life of every plant—unlike Nitrogen—is not available from the air, nor can it be obtained through Bacteria, and all soils used for growing plants are losing it with every crop grown. Every quarter of wheat, every pound of meat and every quart of milk sent away from the farm, reduces permanently the Phosphates that were in the soil.

The rich prairie soils of America—some of which, through their stores of Nitrates and Phosphates—gave enormous crops in the early years of wheat growing, have dwindled till sometimes in fifteen or twenty years from their first cropping, the output of the wheat dropped to one-third of the crops originally grown. In America, and the new countries with ample land, the farmer has gradually moved away from the once fertile soils, now worked out, into new territories, but these new, rich, virgin lands, at any rate in the North American Continent, are coming to an end, and the lands nearer the big centres of population are now being brought back into improved cultivation with the help of artificial fertilizers.

In four of the older states of America they have now reached a consumption of over two million tons of Superphosphate alone each year, that is to say, more than double the whole quantity used in the United Kingdom.

The following is a recent quotation from an American journal devoted to soil fertility. "There is

to-day definite proof that the farmers of the country as a whole could use to their own profit, ten times as much fertilizers as they do use at present."

All Scientific Agriculturists in Europe have, for several decades, realized that there was not sufficient farmyard manure to supply a fraction of the needs of Agriculture and, starting with Guano, have, as that became exhausted, turned on to Superphosphate and Basic Slag for the fertilization of almost every crop now produced by the farm.

The following Table will indicate in general the increase in the use of artificial manures in the country most progressive in their use, viz., Germany :

TABLE V
GERMANY'S USE OF FERTILIZERS

	1890. Tons.	1900. Tons.	1910. Tons.	1912. Tons.
Phosphatic Manures	1,045,000	1,735,000	2,817,000	3,566,000
Nitrogen ..	358,000	520,000	850,000	1,086,000
Potash Salts	219,000	833,000	2,219,000	2,700,000
Total....	1,622,000	3,088,000	5,886,000	7,352,000

While the actual total Fertilizers consumed in the United Kingdom in 1912 was only 1,437,000 tons.

In regard to increased food production in Great Britain, calculations have been made by a Committee of some of the most experienced Scientific Agriculturists of the day as to the quantities of artificial fertilizers which it would be necessary to use in the United Kingdom, if, and when, we produce from our home soil all the food that the Nation requires.

The quantity of Nitrogen may be modified and reduced as the methods of its fixation by Bacteria, or directly from the air into the soil, become more developed, and the growing leguminous crops and green manuring become more prevalent. There is, however, no way of doing without the supply of artificial Phosphates if human life is to be sustained and the population of the British Isles is not to diminish.

TABLE VI

QUANTITIES OF ARTIFICIAL FERTILIZERS REQUIRED IF ALL THE FOOD OF GREAT BRITAIN IS TO BE PRODUCED FROM ITS OWN SOIL

	Phosphatic Manure. Tons p. a.	Nitrogen Manure. Tons p. a.	Potash as Sulphate. Tons p. a.
Requirements for 24,000,000 acres of arable land in cereals, roots, clover, etc.	2,400,000	700,000	230,000
Required for 24,000,000 acres permanent grass and for hay	1,100,000	100,000	70,000
Total artificial manures required:	3,500,000	800,000	300,000

The world's production of Superphosphates is about 14,000,000 tons, and of Chili Nitrates more than 2,000,000 tons, while the output of Sulphate of Ammonia Nitrogen is of equal importance. Germany and Alsace supply the world with more than 10,000,000 tons of Potash Salts.

Prices in England before the War varied but slightly. They were about as follows :

Superphosphate, 30 %.....	£2 10s.	per ton on rail.
Basic Slag, 30 %.....	£1 15s.	„ „
Nitrate of Soda	£9 to £12	„ „
Sulphate of Ammonia ..	£11 to £14	„ „

* * * * *

Sixty years of continuous Wheat growing every year at Rothamsted, when the soil was supplied with Superphosphate, as well as Nitrates, gave a yearly average output over the whole of that period of 35 bushels of Wheat and 34 cwts. of Straw.

With an excess of farmyard manure and no artificial fertilizers, an adjoining plot over the same sixty years gave 31 bushels of Wheat and 31½ cwts. of Straw.

Sixty years Barley growing continuously produced 43 bushels on the average of Barley, and 26 cwts. of Straw when fertilizing the ground with Superphosphate plus Nitrogen.

These figures of output are all above the average produced in Great Britain according to the Board of Agriculture's Returns for the above years, and show that, while it may not be economical to grow cereals continuously, there is no physical, or chemical, or bacteriological reason against continuous growing of Wheat.

A whole farm in Hertfordshire, owned and managed by a farmer who had learnt his profession in the continuous Wheat growing areas of Canada, was for twenty-five years devoted to continuous Wheat growing. The soil was of a clayey description, but through getting his ploughing done rapidly in

the autumn with mechanically driven ploughs and by the free use of Phosphates and some Nitrates, he was able to do the work regularly every year and to get crops which exceeded the average of the output of the whole of the United Kingdom during the years in question.

On the Surrey-Sussex border, a farmer has, for the past five years, 1918-1922, put his entire 150 acres of fairly heavy ploughed land in with *Wheat each year*, and in 1922 his crop averaged 50 bushels of Wheat per acre. He was able to do this by the use of a tractor and got a most satisfactory profit each year, even in the last year, when he only obtained 45 shillings a quarter for his Wheat.

The Agricultural Colleges and Testing Stations all over the world have demonstrated the necessity for, and the increased yield obtained, from Phosphates, and when it is realized that 3 cwts. of ordinary Superphosphate supplies as much immediately available Phosphate plant food as does a heavy coating of 15 tons of farmyard manure, its relative importance will be realized.

Phosphates remain in the soil and are not washed out by winter rains, and, when put on in the form of Superphosphate, are immediately soluble and ready for plant use. Fed with them, the crop matures earlier, thus giving more security of a safe harvest, and more time for ploughing the ground in the autumn, or for a following green manuring crop. Phosphates advance the time in cereal root development, and when they are available in abundance in any soil, the roots are able to feed the plant

quickly and one gets in the crop the same sort of result which is seen in the six month old calf, which has had plenty of milk, as compared with the one brought up on a short supply.

Even the Rothamsted authorities now state that, in their opinion, Phosphatic manures are of almost equal importance with the Nitrogenous fertilizers, and as Rothamsted is the home of Scientific Agriculture based on Nitrogen, this expression of opinion, after sixty years of experience, is worth considering. They also state that "Phosphates improve root development not only in Swedes and Turnips, but of Cereals also." Again, "Phosphates encourage leguminous herbage and greatly improve the feeding quality of the herbage. Nitrogen compounds encourage the grasses and largely increase the bulk of hay."

According to the highest authorities, the value of farmyard manure, through difficulty in handling, storing, etc., is half lost before it gets to the crop. Some of the causes of loss are, no doubt, however, avoidable. Artificial Phosphates, on the contrary, are all saved for the use of plants.

There are two main sources of artificial Phosphate supply, and as one of these, when it is fully developed, will be capable of supplying a very large proportion of what the United Kingdom will need, it will be dealt with first.

This source of supply is Basic Slag, a by-product in the manufacture of Pig Iron from those Iron Ores which contain Phosphorus. Fortunately for the future agriculturists of this country, and for the iron masters, when more of them realize it, the huge

Iron Ore deposits which exist in England are fairly high in Phosphorus. Before the War, the Iron made from these Phosphoric Ores, when converted into Steel, was, through prejudice and ignorance, not considered of equal value, for a large number of purposes, to the Steel made from foreign Hematite low Phosphorus Ores. The fact that America and Germany each used 80 or 90% of steel made from Phosphorus Ores was not accepted as an argument in their favour in the United Kingdom. However, the production of shells, and the thousand other uses to which Steel was put during the War, have wiped out the prejudice, and it is now admitted that, except for comparatively unimportant quantities of Steel needed for special purposes, what is known as Basic Steel made from Phosphoric Ores is entirely satisfactory for all purposes.

Within 10 feet of the surface in half a dozen English counties (running in a sweep from Frodingham in the north of Lincolnshire, to Banbury in Oxfordshire) there has actually been proved to exist, together with beds of Iron Ore in the Coal Measures, sufficient Iron Ore to supply the whole of the needs of the United Kingdom, at a normal rate of output, with all the Pig Iron that is needed, for rather over three hundred years to come. These Ores are lower in Iron than the average of the imported Ores, but in melting them, the resulting Basic Slag, when it is ground, has a very great value as a supply of Phosphoric Acid for fertilizer purposes. Its production as a by-product in Iron Smelting reduces the cost of the Pig Iron to below that made from imported Ore.

This Basic Slag is particularly suitable for the improvement of grassland, because its Phosphoric Acid contents is only partially soluble when it is put on the soil, but enough so to start the Clover plants and encourage them in their growth. The rest of the Phosphoric Acid it contains is gradually made soluble by the organic and other acids in the soil, and it goes on feeding the Clover plant over the second year of its growth when it is beginning to give a crop, and during the third and fourth years when it is in its most abundant time of growth.

Superphosphate is the other source of Phosphatic Manure. It is above all others most suitable for cereal and root growing because of the immediate availability of all its Phosphoric contents for plant food. Superphosphates are made from Phosphate Rock, mined in the north of Africa, and three of the south-east States of America, and from two or three islands, which have fortunately now come under British control, in the Pacific.

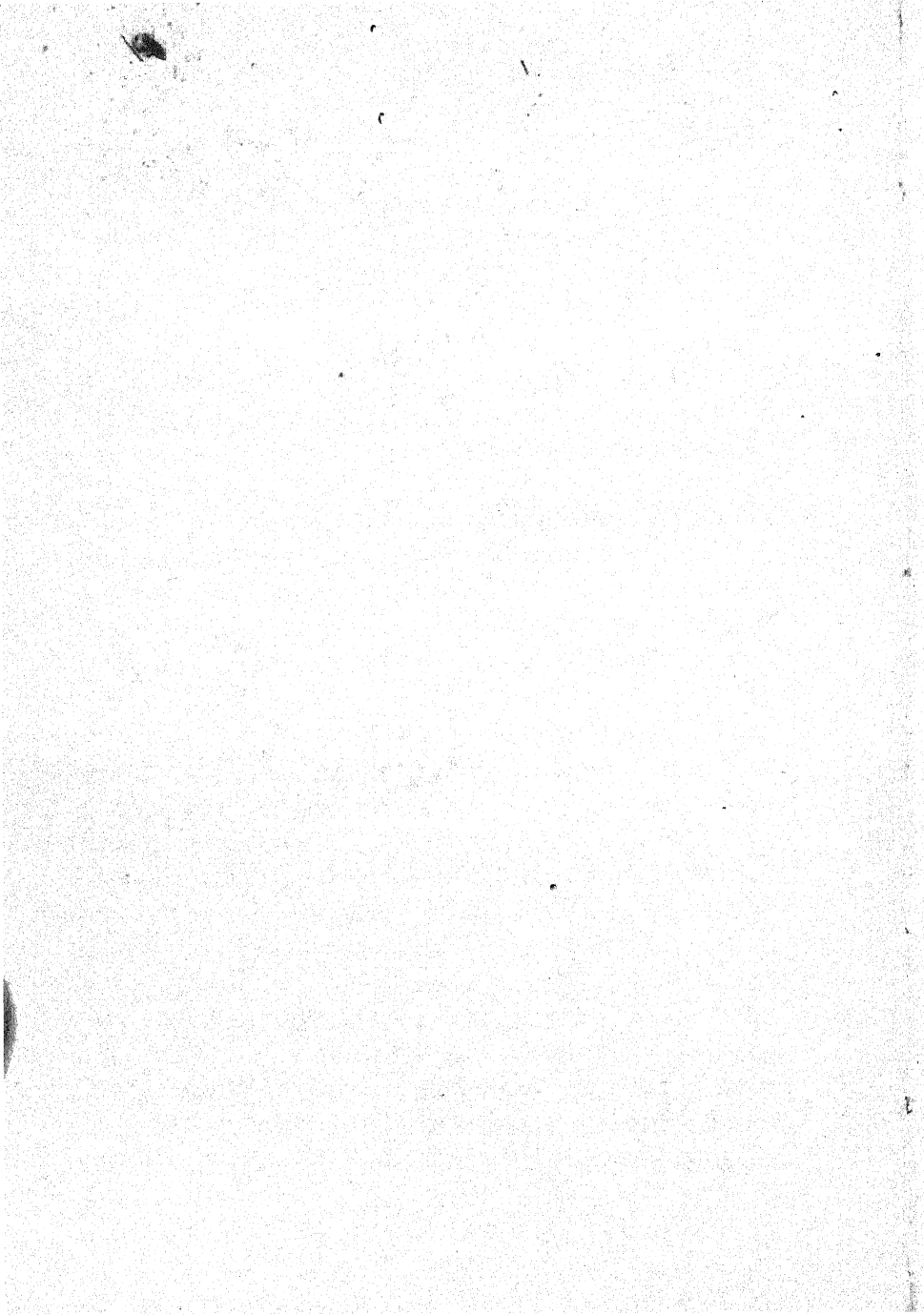
The Phosphate Rock is ground in factories at coast ports of the United Kingdom, and, after being treated with Sulphuric Acid, to make the Phosphoric Acid soluble, is supplied in bags to farmers. The price before the War was less than £3 a ton of the grade generally used in Great Britain. While freights and other causes have increased its price for the time being, it will be a good day for the true interests of the country when Phosphatic manures come down towards pre-war values.

Professor Wood, who, in addition to being the head of the Cambridge Agricultural School, is on the

Management Committee of Rôthamsted, says : "All soils, almost without exception, require manuring with Phosphoric Acid at least once in every rotation. After experimenting on soils in ten counties for over twenty-five years, I have only found one isolated district where Phosphatic Manures failed altogether to produce a definite increase.

"Phosphoric Acid—and Nitrogen too—accumulate in the seeds of plants and in the bones and flesh of animals and in milk. All these products are sold off the farm. This has been the custom for long and, consequently, our soils have been gradually exhausted of Phosphoric Acid and Nitrogen and the need for manures containing these substances is general. Except for potatoes, crops can usually get all the Potash they require from loam and clay soils."

The Committee of the leading German Experts advising their Government during the War, stated that "The question of the supply of artificial Manures is of the greatest importance. The enormous extension of our Agriculture is largely due to them. We have been able to increase the yield of our fields per unit of area and at the same time to increase our whole harvest considerably. During the last thirty years our crops of grain and potatoes have been able to keep pace with the growth of our population. The production of meat, which is, of course, closely connected with the production of sufficient fodder, has developed in a similar favourable way."



CHAPTER V

CAPACITY FOR INCREASED OUTPUT



IN studying the future possible increase of output from the soil of Great Britain, Table I., on page 11, will be useful. It is compiled to show what articles imported in a normal year could be produced from our own country, within the limitations of its climate, and its area of cultivated land. This can be done when the suitable areas, now semi-unproductive, are farmed on those more intensive methods which are practised in a few of the Counties of England—Counties in which the plough has dispossessed a good deal of the grass land. These well-farmed Shires, as will be shown in a later Chapter, are already producing on such a scale that England would be entirely self-supporting if their good methods were followed on the suitable land of the other Counties.

It may here be observed that the Imports which we could produce from our own soil come chiefly from Foreign Countries, and that less than one-third of them came from British Colonies and Possessions :

TABLE VII

VALUE OF FOOD PRODUCTS IMPORTED INTO THE UNITED KINGDOM
FROM COUNTRIES OUTSIDE THE BRITISH EMPIRE IN 1913

	£
From United States	40,966,147
„ Argentine Republic	36,865,231
„ Denmark.....	19,703,185
„ Germany	12,031,468
„ Russia	9,758,562
„ Netherlands	7,580,361
„ Roumania	286,600
„ Uruguay	954,280
„ Egypt	2,065,441
„ Sweden	2,047,634
„ France	1,505,442
„ Italy	343,838
„ China	301,595
„ Other Foreign Countries....	67,867,081

£202,276,865

While Imports and Exports are being dealt with, it may be well to point out that the loss which we may sustain in future, if we are unable to retain more than three-quarters of all our former markets for Export Manufactured Goods, is not absolutely vital. The United Kingdom only derived a profit of about £200,000,000 a year net from Exports of Manufactures.

The loss, on the other hand, may, to a large extent, be compensated for by manufacturing at home (often in the factories hitherto used for exports) a large proportion of the following manufactured articles, which we were in the habit of importing before the War for our own use, in a ready-made condition :

TABLE VIII

IMPORTS OF MANUFACTURED GOODS (OF A NORMAL YEAR) WHICH COULD BE
MADE IN THE UNITED KINGDOM FACTORIES

	U. K. could produce £
Iron and steel and manufactures thereof	15,231,633
Cutlery, hardware implements (except machine tools and instruments)	7,378,360
Manufactures of wood and timber (including furniture)	3,583,187
Yarns and textile fabrics (value less cost of imported raw materials):	
1. Cotton	6,124,923
2. Wool	5,245,223
3. Silk	7,557,690
4. Other materials	4,564,591
Apparel (value less cost of imported raw materials)	2,989,836
Leather and manufactures thereof (including gloves, but ex- cluding boots and shoes) (value less cost of imported raw materials)	6,715,381
Earthenware and glass	4,546,267
Paper (labour only)	3,837,210
Railway carriages and trucks (not of iron), motor cars, cycles, carts, etc.	8,357,424
Baskets, basketware, brooms, etc.	693,007
Fancy goods	1,100,743
Glue, size and gelatine	524,885
Matches	532,633
Musical instruments	1,178,806
Plaitings of straw and other materials	953,726
Soap	482,363
Starch, dextrine and farinal	1,311,044
Stones and slates	1,277,701
Toys and games	1,452,723
Books, printed, and other printed matter	497,106
Buttons and studs (not of metal)	913,339
Corks, manufactured	856,155
Curios	201,579
Flowers, artificial	832,417
Jewellery	379,657
Mats and matting	212,089
Perfumery	175,653
Pictures, prints, etc.	792,198
Pipes of all sorts for smoking tobacco	322,898
Rubber, manufactures of	717,478
Skins and furs, manufactures of, including skin rugs	1,174,967
Stationery, other than paper	560,455
Goods, not enumerated, manufactured wholly or in part	3,721,096

Total ready-made goods imported, which might be made in
England £96,906,439

Although it is not the purpose of this volume to deal with Manufactures as such, manufacturing and Soil Production must go hand in hand in the Nation's Programme. There has hardly ever been such a shortage of labour in the United Kingdom as would prevent there being enough workers for both industries, and it should be realized that the National wealth produced from Agriculture is all pure profit to the Nation. In factory exports 40 to 50% of the value of the goods is made up of raw and other materials we have had to buy from foreign countries, and the profit to the Nation is, therefore, comparatively small.

Populations, however, live upon food. They must have it every day and in sufficient quantities, not only to maintain the body in health, but also sufficient to supply the power for work. Food, therefore, is the first essential in the life of a Nation. Factory production, such as essential clothing, is also necessary. For long periods, however, both we at home and consumers abroad, can do without a good many products of the factory. The great reduction in our factory export sales is no doubt due to under-cutting by foreign countries, yet a very large proportion is also due to the fact that foreign consumers will not purchase goods which they consider are offered by us at too high a price because of the temporary high costs of our labour.

* * * * *

No other country but England is so dependent upon imported food. Germany nearly won the War

because she was almost self-supporting, while her submarines were at one time almost able to stop our imported food supplies. All countries but our own seem to have learnt the lesson of the War in regard to home production, and the energy which they are putting into producing from the soil has been stimulated to even a higher pitch than formerly. In England alone we are again laying down, in unproductive grass, hundreds of thousands of acres of plough land, while other countries are further intensifying their methods of Agriculture.

The following Table will show the number of acres of each kind of crop it will be necessary to grow in the British Isles if we are to produce what we have been in the habit of importing, as well as what we have hitherto grown :

TABLE IX

UNITED KINGDOM—PROPOSED FUTURE CROPPING

	Present Practice. Acres.	Proposed Future Cropping. Acres.
Wheat	1,791,000	8,000,000
Barley	1,932,000	3,000,000
Beans and peas.....	440,000	1,000,000
Oats	3,983,000	5,000,000
Total cereals	8,146,000	17,000,000
Potatoes.....	1,185,000	1,200,000
Turnips	1,770,000	1,800,000
Mangolds	501,000	1,000,000
Temporary grass :		
For hay	3,025,000	3,000,000
Not for hay	3,618,000	—
Bare fallow, etc.....	1,187,000	—
Total arable plough land.....	19,432,000	24,000,000
Permanent grass :		
For hay	6,798,000	6,798,000
Not for hay	20,511,000	15,943,000
Grand total	46,741,000	46,741,000

The proposed future cropping would produce in Food Value 22,000,000 tons of Starch Equivalent, which is also the tonnage consumed in a year in this Country from total Production and Imports together.

It should be explained that, for convenience of comparison of Food Values, the "Starch Equivalent" contents of each kind of product is accepted by Scientific Agriculturists, and is used as a common denominator in calculations. In order to check the

United Kingdom requirements against the programme used in the Table of proposed production, the items were converted by the accepted values into "Starch Equivalents" of Food Output.

The production and the requirements check out very closely. As a further check it may be mentioned, but without introducing another elaborate Table, that a similar Table for the "Starch Equivalents" of the total German Production and Consumption before the War was drawn up to check if the English figures of what people required in the way of food were reasonably correct, and it was found that they corresponded closely.

Working, therefore, upon the number of acres needed for each crop, it becomes necessary to see whether the required land is available. The examination of the acres of cultivated land available shows that, by breaking up an additional four and a half million acres of grass land, there will be more than enough ground to provide the total plough area required, as well as to leave, on the average, half the farm lands of the Country still laid down to grass.

In a subsequent Chapter comparing the various Counties of England one with another, it will be shown that the plough acreage will be obtained without creating any serious revolution in present practice.

In England and Wales, there are still 2,250,000 acres of grass land which were cultivated under the plough before the slump that commenced in 1870, which are still down at grass. Some small portion of these fields would not be selected for again breaking up, but the bulk of that land is obviously available

for plough farming. In addition to this, it would only be necessary to break up two and a quarter million acres which have hitherto always been grass. In England alone, to the South and East of a line drawn from Newcastle through Bristol, there are 4,000,000 acres of available grass, after leaving one-third of the cultivated area still in unploughed grass land. The quantity of previously unploughed land to be broken up in excess of what was formerly under the plough does not seem a very revolutionary programme as compared with the 2,000,000 acres broken up during one year, viz., the last year of the War. It is true this was done under moral pressure and under the stress of war, but it is also true that it was carried out by farmers who had lost the bulk of their labour, and to replace whom only wounded soldiers, German prisoners and women could be allotted.

Farmers cannot be expected to go in for the heavy first cost and larger lock-up of capital and the energy involved by the method of cultivation needed for intensive plough farming, unless they are secured against making a loss by practising a system of Agriculture which the National needs impose upon them, but which often does not suit their own inclinations. It must also be clearly understood that the farmers of the Country will not accept any more "Government Guarantees" in future, that are not backed up by something more substantial than a Corn Production Act, which a flighty Politician tears up practically without provocation, thought, advice, or even pressure.

On the other hand, the Nation's needs in regard to

development of British Agriculture will become so great that, under pressure from the Town workers, Statesmen will have to find the means of inducing Farmers to employ more labour to grow the quantities of food which are needed, rather than practise the unintensive and less energetic grass farming which many of them prefer.

* * * * *

Comparing output from grass land and plough land, the following facts should be remembered :

A hundred acres of average grass land produces food equal to that required by twenty people.

The same hundred acres ploughed up produces the food of eighty people.

A hundred acres of grass produces the food for thirty-eight cattle for a year.

The same hundred acres broken up and partly devoted to growing bread grain provides bread for about forty people and feeds thirty-five cattle.

If a hundred acres of ordinary grass is ploughed and cropped specially, year by year, with the object of feeding cattle only, it will produce enough food for fifty cattle as compared with thirty-eight, if left down to grass.

Or, on another series of figures and dealing with areas of one acre :

If the crop from one acre of plough land is used in feeding cattle, it will produce about 250 lb. of meat and 350 gallons of milk.

The same acre not ploughed, but left down as grass,

would not produce quite 120 lb. of meat and 170 gallons of milk.

An acre of grass used for rearing cattle only produces an increase in the live weight of the young animal of about 150 lb. in a year.

The same acre ploughed and farmed under rotation gives sufficient cattle food to increase the weight of an animal by more than 150 lb. and, at the same time, produces as much grain as will provide the bread of three average people for a year.

Under another rotation of crops, a ploughed acre produces 2,000 lb. of "Starch Equivalent" in a year, that is 2,000 units of food.

Under permanent grass the same acre will give less than 650 lb. of "Starch Equivalent."

The permanent grass land of the country is, therefore, only providing about one-third of the human food it would produce if farmed properly under the plough.

Our present system of producing so much of our food indirectly by using such a large area of our cultivatable soil in the form of grass to feed animals, compares very unfavourably with grôwing such direct human food crops as wheat, oats, potatoes and vegetables, which give rather more than ten times the amount of human food that is produced from the same area of land devoted to growing meat and dairy produce on grass land.

After all, Agriculture has for its sole object the production of food for human beings, and the most direct manner towards this should always, in the Nation's interest, be the only point kept in view.

The German farmers cultivate 80% of their farm area under the plough. British farmers plough only 40% of theirs, having 60% under grass.

While dealing in detail in a later Chapter with the relative progress of Agriculture in Foreign Countries as compared with that of Great Britain, it would be well, in connection with the problems dealt with in this Chapter, to mention evidence given before Lord Selborne's Agricultural Policy Committee at the end of 1916 :

On each hundred acres of farm land :

1. The British farmer feeds from 45 to 50 persons ; the German farmer feeds from 70 to 75 persons.
2. The British farmer grows 15 tons of corn ; the German farmer grows 33 tons.
3. The British farmer grows 11 tons of potatoes ; the German farmer grows 33 tons.
4. The British farmer produces 4 tons of meat ; the German farmer produces $4\frac{1}{4}$ tons.
5. The British farmer produces $17\frac{1}{2}$ tons of milk ; the German farmer produces 28 tons.
6. The British farmer produces a negligible quantity of sugar ; the German farmer produces $2\frac{3}{4}$ tons.

“That the British farmer is much more favoured by nature is the view of leading German

agriculturists in that their soils and climate are distinctly inferior to those of Britain."

Lord Selborne's Committee also says :

" Before the War, the value of foodstuffs, including sugar, which we imported into the United Kingdom from overseas, though capable of production within these Islands, was of a value of about £200,000,000. We have no hesitation in saying that by the adoption of a complete policy by the State, a large portion of this could be produced from within the British Isles."

CHAPTER VI

METHODS OF INCREASING GRAIN OUTPUT



IN this Chapter it is proposed to put forward measures for the increased production of grain crops in the British Isles. The largest step towards this will undoubtedly come from the decrease of grass and increase of plough land.

It has been shown in Chapter V. that plough land will produce much more meat and milk, as well as cereals, than would be obtained from the same land if left under grass.

The layman may wonder why the Farmer himself has not taken advantage of this fact, and, in answering such a question, human psychology has to be taken very much into consideration.

In the first place, until called upon by the Government about the middle of the War, and energized by the Food Production Department, it is doubtful if the British Farmer realized at all that more was wanted of him. He, like his father and grandfather, had carried on farming by certain methods, which methods were usually those prevailing in his County or district.

The Farmer in Norfolk and Suffolk was doing well by his land. He was ploughing the bulk of it, and fertilizing it, and one year with another, the good farmers were making 12%, 15% or even 20% out of their investment.

It is true they were working fairly hard and, at the

same time, their soils were not, as a rule, very difficult to work.

The Farmers in the deep Alluvials and the rich country round Lincolnshire and Cambridgeshire were practising very intensive Agriculture and raising very large crops of potatoes, amongst other things.

On the other hand, the temperament of the Somerset Farmer was well suited to leaning over a gate and watching his cattle feed on a large acreage of grass, his family and farm servants not having too hard work in milking them twice a day for eight to nine months out of the year, after which a great many of the cows were allowed to dry off.

The grass farmer had neither the energy, nor the capital, nor the inclination to do much work when he was making a decent living, as were his neighbours, by this most primitive and unintensive form of Agriculture.

If urged to plough up some of his land, he would reply—the land is too heavy, or too low, or too high, or no cottages for additional men are available, that his landlord would not help him to drain, and the like, and so for fifty years, in that sort of district, the situation has remained unchanged.

There is another type of Farmer who likes to feel that he is occupying a big acreage and is thereby somewhat of a personage in the district. He does not realize it, but he is really only farming perhaps half his land, as he has neither capital, men, nor energy to do more. He grows a crop of Wheat on his plough land once in four to five years. He lets his seeds and clover remain down for several years until they

become really worse than poor pasture. All his manure is put on for the one crop of Wheat, or the roots preceding them, and little or nothing else is done to increase fertility. He resents being asked why he does not grow more and really believes he is doing his utmost, and no one can blame him for want of good citizenship, as it has never been put to him that he has a duty to the State as to production, as well as to himself as to profit. He generally thinks he can make more out of his un-intensive methods than he would if he had to plough and cultivate his often heavy land. This class of land takes such a lot of labour before it will give a good crop, but when once thoroughly cultivated and fertilized, and intensively cropped, will give a larger profit in return.

You cannot bodily remove the intensive plough farmers from Suffolk, East Yorkshire, or the Lowthians, and get them instantly to modernize the Somersetshire methods. The Nation will continue to suffer severely unless, by education, propaganda, moving about, persuasion and guarantees against loss, the grass farmer occupying suitable land is made to change his ways, or to give up his land to those who will practise more intensive forms of Agriculture in the Nation's interest.

In a later Chapter, comparing climate and output of various Counties, the problems of area against area will be specially dealt with, but the one big general question of bringing into more productive use the heavier Loams and Clay lands now under grass, may best be dealt with here.

The author of the doctrine is unrecorded, but it is

none the less true that "Increase of population and the fact that people live on food and not on manufacture, will eventually bring the Clay soils into the sphere of large Agricultural production under the Plough."

It is very largely to the Clays that exist in parts of most of the backward Counties that the Nation will have to look for increased output. The difficulty with the Clays is not so much one of want of fertility as the mechanical difficulty in so stirring, breaking-up and inter-mixing the particles of soil, so as to get the plant foods in the soil into a soluble condition and the roots of the plant enabled to come in contact with these foods, to absorb them into the plant.

Even the man unacquainted with Agriculture will easily realize that a Farmer cannot afford, when Corn is low, to keep a dozen horses in order to be able to plough all his worst Clay soils during the autumn only, because in the winter and spring they are too wet and sticky to break up properly. The horses and the men to attend them were eating their heads off during these idle months, and, consequently the cost of tillage, the cost of capital for horses and implements and cottages became too heavy and a lot of Clay land was allowed to go back to a prairie state.

The War, however, has had one permanent good effect on British Agriculture. It has taught us the use of the farm Tractor and what can be done with it.

A Tractor, operated by one man, can, in the four autumn months, do as much ploughing and stirring and cultivating of the ground as six horses and three men could in *double* that time.

The Farmer, therefore, who cultivates on a large enough scale to own a tractor, can, even before his sheaves are lifted, skim the weeds off the very dirty fields by the use of the Tractor. Directly the crops are moved, he can immediately begin ploughing, and when his ploughing and seeding are finished in November, or it is stopped by too heavy rain, the Tractor is put away and eats nothing for many months to come.

The one Tractor man can be employed in general farm work, including helping the Stock Tender with the extra work falling on him in winter.

In spring, the Tractor comes out again, prepares the ground for putting in the Spring Corn, helps to cut the hay and can then lay up till harvest, while its operator is hoeing Roots.

The Tractor, therefore, while not entirely taking the place of all horses on a farm, a reduced number of which must still be kept on most farms, is an enormous economizer of time, labour and cost, and its advent has shown that the practice of clay farming under the plough is, to say the least, now economically possible, where before it was a doubtful problem.

Clay soils, when they were under the horse plough, as a matter of fact, never got nearly enough cultivation, because sufficient horses were seldom available to do ploughing, cross-ploughing, sub-soiling, several cultivations, rollings and harrowings on a large enough area in the short period available, before the winter rains, and after the spring dry-up.

Once granted that you can sufficiently cultivate Clay soils at the proper time, their crops, especially

of wheat, are very satisfactory. Clays contain nearly all the plant foods necessary for a moderate crop, but for a large crop it is economical to supply Phosphates generally in the autumn, and a small quantity of Nitrates in the spring. Of course, all the farmyard manure that is available should be put on, but there is never enough to go round the grass and the plough land, and produce fairly large crops on all the fields of a farm. Therefore, under good farming methods, Phosphates are artificially supplied, and Nitrates are either obtained by means of leguminous cropping, or small dressings of Nitrogenous fertilizers.

* * * * *

The second most important change which should take place in British Agriculture, in order greatly to increase what is the ultimate end of Agriculture, namely, the production of human food, is the cropping of plough land at much closer intervals with those plants which give the largest yields in the most direct form towards the supply of human sustenance.

The whole farming industry of the Country, almost without exception, has got into the habit of following certain Rotations of crops. Probably the Rotation most followed is what is called "The Norfolk Four-Course System." This means that, once in four years, the soil grows human food—wheat. The other three years are occupied with one crop of "Roots" (mangolds or turnips), one crop of oats (sometimes barley) and one crop of seeds, which includes clover,

followed again by wheat and the other crops as before.

This system arose through the observance, on the part of the Farmer in bygone generations, of the fact that wheat grew well after clover. They did not know why, but it is now known that the clover plant took Nitrogen out of the air and fixed it in the soil, to be utilized later to help the growth of the wheat.

The "Roots" were used in the rotation as a crop which allowed for cleaning the land by hoeing and to provide food for the cattle which trod down the wheat and barley straw into farmyard manure.

When sowing the "Roots," farmyard manure is generally supplied to the soil, and the barley was a sort of saving crop put on to get some of the good of the farmyard manure left unused by the "Roots." This Four-Course System is no doubt, under certain conditions, an economical form of Agriculture for the Farmer himself, but is certainly not one which gives the Nation any fair return from its soil.

We have seen that wheat, the most direct human food, can be grown continuously, year after year, but it is not generally economical to do so, although the old Kentish custom was to grow three cereals, viz., wheat, barley, beans, wheat, barley, beans, continuously. It would be too great a revolution to suggest to most farmers that a wheat crop should be grown even every other year. On the other hand, wheat or other cereals ought to occur much more frequently in rotation than in the Norfolk System, and in order to explain a better Rotation, it will be well to deal with an eight-course system.

Already in some very few districts, a custom is established under which, in an eight-course system, cereals appear six times in the eight years. The system is about as follows :

- 1.—Roots.
- 2.—Oats.
- 3.—Barley.
- 4.—Peas or Beans.
- 5.—Wheat.
- 6.—Clover.
- 7.—Wheat.
- 8.—Barley.

To get six corn crops out of eight and, at the same time, do all that is possible in fixing Nitrogen in the soil from the air during the rotation, one of the three following systems could be adopted. :

1	2	3
Clover,	Clover,	Clover,
Wheat,	Wheat,	Wheat,
Barley,	Barley,	Oats,
Roots,	Roots,	Roots,
Oats,	Oats,	Wheat,
Barley,	Peas,	Barley,
Peas,	Wheat,	Peas,
Wheat.	Oats.	Wheat.

The third of these Rotations would give six corn crops, including three wheat crops, in eight years, and as the clover crop and the pea crop both fix Nitrogen, would be economical in Nitrogen.

The root crop given in each of the Rotations could, if desired, be replaced by Crops of ensilage to save the labour of root cleaning, and in the autumn of the

ensilage crop green manuring could be practised if thought desirable.

By either of the three systems we get six corn crops in eight years against only four in an eight years rotation of the Norfolk System.

Rotations of other crops, instead of growing a wheat crop every year, are economically advisable for three chief reasons :

1. You get Nitrogen into the soil free of cost ;
2. Labour is spread much more evenly over the year ;
3. You get crops of roots, or ensilage, to supply the bulk of the food necessary to keep cattle, which again, in their turn, are necessary for converting the straw into farmyard manure.

A more intensive rotation of corn crops than has previously been practised generally in England is obviously essential, when it is realized that, including potatoes, we only grow 8,000,000 tons of corn crops and potatoes, while 50,000,000 tons of crops are grown of hay, straw and roots to feed animals, which in turn only produce somewhat over 1,000,000 tons of meat and dairy produce. The food equivalents of all the above will be seen in Table XXI., in the last Chapter.

The uneconomic method at present practised of farm cropping may also be observed by the Summary of Table X. The Government Census Returns of Agriculture show that the value of farm crops grown and used for the feeding of animals, together with what was imported for their use, amounts to

£110,000,000 a year. The market value of the meat and dairy produce sold off the farms hardly reached a value of £100,000,000. There probably have been some cumulative errors in the Census Returns, but the figures, if only approximate, are startlingly suggestive.

TABLE X

TABLE OF VALUE OF PRODUCTION OF SOIL OF GREAT BRITAIN
ACCORDING TO LAST CENSUS OF PRODUCTION

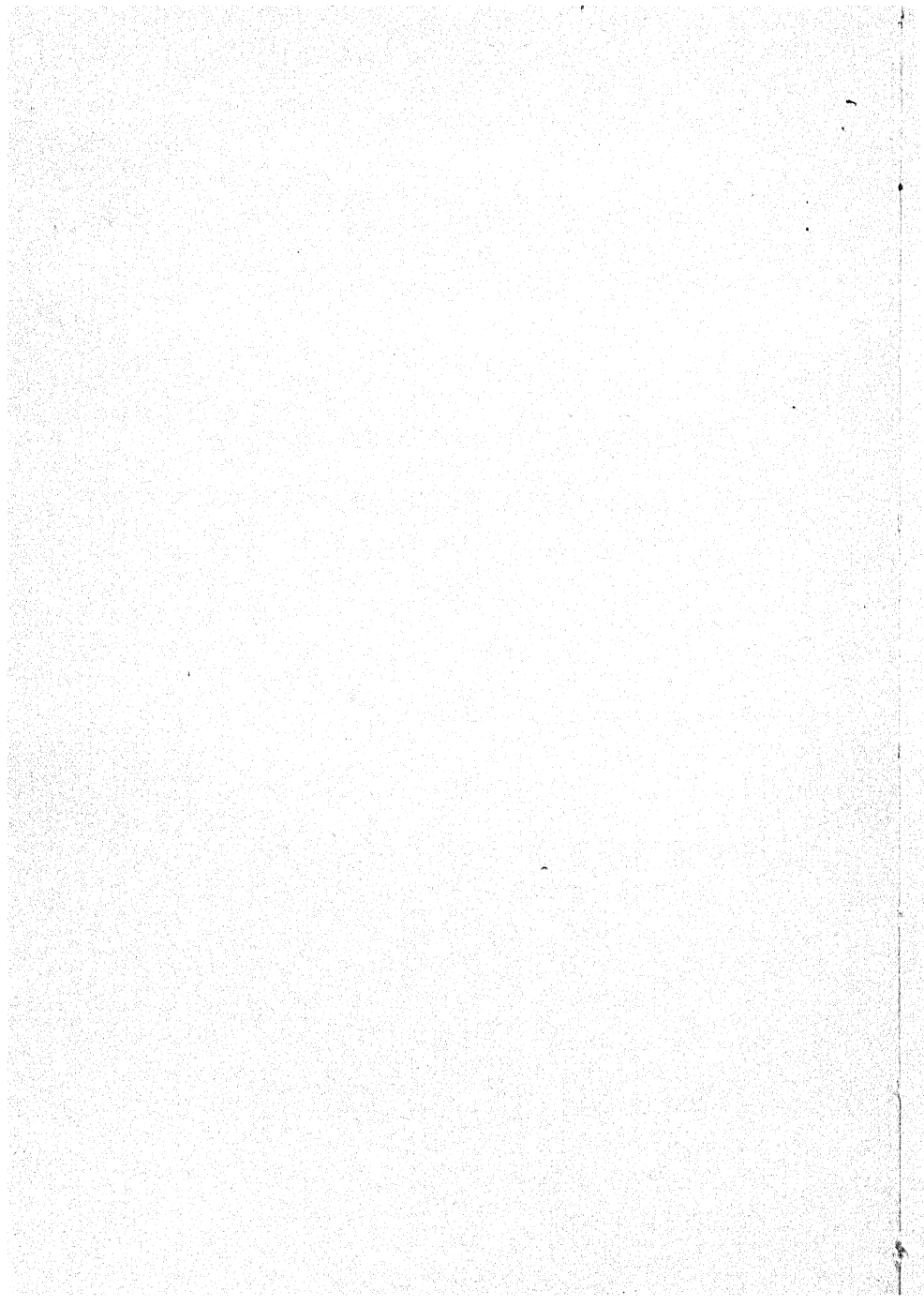
	£
Farm crops	123,449,000
Less used for producing meat and dairy produce	97,517,500
	<hr/>
	25,931,500
Animals and meat	61,412,000
Wool.....	3,100,000
Dairy produce.....	29,893,000
Vegetables	2,071,800
Sugar	<hr/>
Fruit, flowers, cider	4,731,000
Eggs and poultry	5,000,000
Timber and underwood	800,000
	<hr/>
Total	£132,939,300

* * * * *

Another very important development in British Agricultural methods will be the greatly increased use of plough land to grow fodder crops to a larger extent and with a greater output per acre than has ever yet been contemplated on a considerable scale. It is true that several million acres are supposed to be devoted to growing clover and other rotation grasses, but these are often left down for a second and even a longer number of years, as in Devon, Cornwall and Scotland, and after the first year, they are really most unintensified in their product.

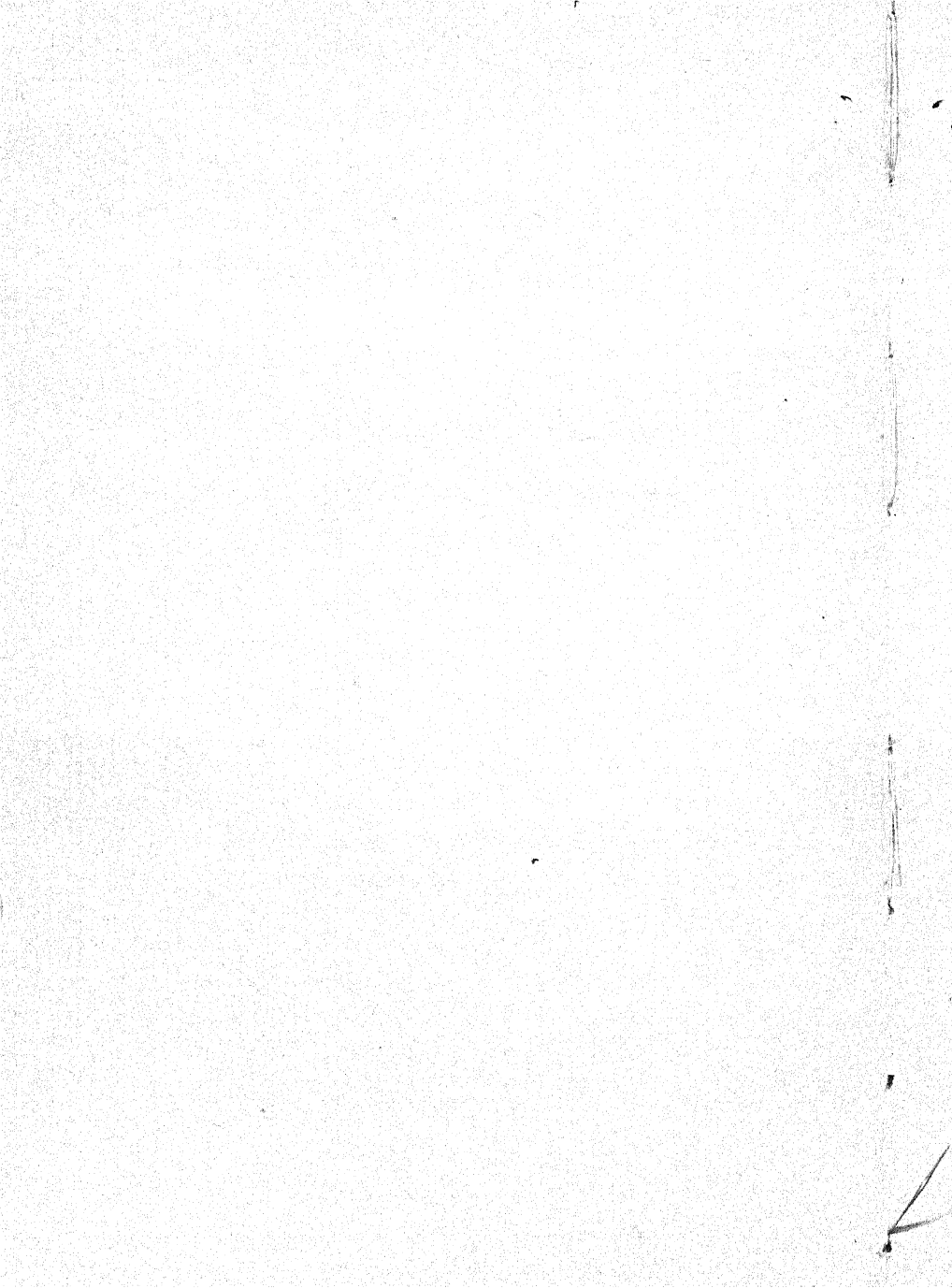
Intensive fodder crops have the double advantage of saving the cost of imported Cake for animals, and also of helping to fertilize the soil when they consist of clover or leguminous crops. They also help to keep the soil open by reason of their roots, and help to kill off weeds by reason of the density of their foliage, which smothers thistles and summer seeds, and even couch, charlock, and docks.

The increase of output that may be obtained by the use of increased quantities of artificial fertilizers has been treated of in Chapter IV., but it may here be broadly stated that by the use of proper sorts of fertilizers to suit the particular soil, the output of all, except the most highly farmed districts, may be increased by 10% to 50% if sufficient money is spent on the fertilizers. It may also be said that each £1 spent wisely on fertilizers will bring an additional return of at least £2 from the next and succeeding crops.



CHAPTER VII

RELATIVE RESULTS OF CEREAL GROWING



IT is difficult to deal with the subject of relative profits of different crops because there is not much exact available data. Farmers are notorious for not keeping books, and very few of those who do can produce the net profit separately of their various crops. Where these are available, farmers are probably shy of showing their results, but in the following Table, there are extracted the profits made by one of the largest and best Farmers in the south of England. He manages 10,000 acres of land, and if everyone was to follow his methods, Great Britain would already be a considerable exporter of food. The exact cost and profit of the entire crops of one of his farms, containing 2,000 acres, was carefully kept by a special book-keeper year after year. He charged against the Farm full rent, according to that prevailing in the district, together with all rates, taxes, and included a very considerable sum for management expenses. The Farm consisted of 750 acres of grass and 1,250 acres of plough land.

In the Table is shown the acreage of each crop grown from 1906 to 1911, together with the *average* profits per acre over *all* those years.

TABLE XI
FARMING PROFITS

CROPS.	1906.			1911.			Average of all years, 1906-11.	
	Acres.	Profit per Acre.	Total profit.	Acres.	Profit per acre.	Total profit.	Profit per acre.	Total profit.
		£ s. d.	£ s. d.		£ s. d.	£ s. d.	£ s. d.	£ s. d.
Wheat . . .	217	3 0 6	658 8 6	389½	4 1 2	1,580 14 5	3 17 0	—
Barley . . .	216½	2 8 4	523 4 2	172½	3 18 10	679 18 9	2 7 9	—
Winter oats . .	136	3 2 10	427 16 8	115½	3 5 1	375 17 1	3 0 1	—
Spring oats . .	108	2 16 1	302 17 0	75	1 16 8	137 10 0	2 4 8	—
Beans . . .	55	3 3 1	173 9 7	—	—	—	1 11 11	—
Peas . . .	48½	0 14 4	32 5 6	7	22 3 6	155 4 6	3 3 8	—
Swede and man- gold seed . .	15½	1 12 11	25 10 3	—	—	—	0 18 6	—
Red clover . .	123	0 7 2	44 1 6	104	9 6 6	969 16 0	2 14 4	—
Sainfoin . . .	25	1 7 7	31 9 7	16	3 14 11	59 18 8	1 14 8	—
Lucerne . . .	52	1 9 2	75 16 8	21	1 11 8	33 5 0	1 1 3	—
Rye, tares, tre- foilium . . .	12	0 0 7	0 7 0	54½	0 5 7	15 4 7	0 3 7	—
Mangold . . .	160	1 15 3	282 0 0	169	0 6 10	57 14 10	1 12 5	—
Potatoes . . .	30½	11 19 10	365 14 11	98½	0 19 3	94 16 2	6 2 9	—
Cabbage, kohl- rabi, etc. . .	50½	0 8 6	11 9 3	31	0 12 4	19 2 4	0 0 2	—
Maize . . .	13	0 17 5	11 6 5	15	1 17 7	28 3 9	1 6 6	—
Permanent grass	750	0 4 1	153 2 6	724	0 3 9	135 15 0	0 6 6	—
	2,009½	1 10 3	3,042 6 6	1,992½	2 2 0	4,189 6 9	1 17 5	3,716 1 0
LIVE STOCK.								
Cows . . .	—	—	122 9 9	—	—	721 3 6	—	972 0 0
Cattle . . .	—	—	25 8 4	—	—	43 0 5	—	54 9 0
Pigs . . .	—	—	5 14 3	—	—	72 16 8	—	31 0 0
Sheep . . .	—	—	0 19 7	—	—	24 1 8	—	22 0 0
Poultry . . .	—	—	79 10 6	—	—	255 16 8	—	111 0 0
Average profit .	—	1 9 9	2,938 13 7	—	2 11 4	5,112 9 0	2 8 11	4,844 1 0

The year 1906 is given in detail in the above Table because it is the worst of the series; 1911, on the other hand, was one of the best years. Weather is the chief cause of variation between different years.

The average profit per acre of each of the six years is as follows :

	£	s.	d.
1906	1	9	9
1907	3	7	5
1908	2	11	11
1909	2	6	0
1910	2	7	0
1911	2	11	4

Average over the six years. . £2 8s. 11d.

The Farm in question is in the heavy Clay district, and is chiefly devoted to growing corn, milk, and latterly, increasing quantities of potatoes. Except for dairy cows, cattle, pigs and sheep were not kept to any extent.

It will be seen that wheat growing on this heavy land was a very profitable undertaking. Only one year in the six did the profit fall below £3 per acre of wheat, and in that year, 1910, the profit was £2 18s. 2d. Winter oats and peas were also very profitable crops, while red clover, in addition to getting Nitrogen into the soil, for the benefit of the next crop, is itself a source of considerable profit.

As compared with the average of nearly £4 an acre of profit from wheat, the permanent grass profit per acre of 6s. 6d. is a decided object lesson.

The cost of growing an acre of wheat depends very much upon the relative lightness or heaviness of the soil, but, as wheat has in the past been grown in every part of England where plough cultivation is practised, it is evident that it has been a profitable crop.

From the point of view of size or area of different farms, farming may be divided into :

The very small farm, in which the occupier does the whole of the work, and the net result is really his wages. If he is an intensive cultivator on rather the Market Garden style of crop, he cannot properly work as much as an acre, as the marketing must occupy part of his time.

If his holding is entirely grass, he may manage up to 30 acres, rearing young stock and keeping four or five milk cows to make butter.

On a part arable, part grass farm, he may manage 15 to 25 acres, selling the milk of six or eight cows, and growing 3 to 5 acres of wheat a year. Ninety per cent. of the farming land of the United Kingdom is, however, in the occupation of farmers who have more than 20 acres, and the bulk of what wheat we grow is really got from farms of 50 acres and upwards.

The tendency of more intensive farming will be towards, on the one hand, the occupation of small areas by individuals, who, by reason of their psychology, want to work by themselves and entirely for themselves. The tendency of this kind of cultivated farm will be to develop into a glorified Market Garden, as corn growing on a one man scale will be economically impossible, and the money to be made from a very few grass-fed cattle will not give the smallholder a living.

The tendency in plough farming will be towards larger areas controlled by one individual or by a Limited Company. Modern machinery, which plays such a large part in plough agriculture, and the keeping

of a larger number of cattle on the same acreage of plough land which was formerly grass, all involve larger capital. The large Farmer, or Company Manager, if he is capable and has business and technical knowledge, can just as well buy and sell and administrate 500 acres, or, with assistance, 5,000 acres, as he could carry on a 200 acre Farm. Hence in the days of close economies and improved organization, the farming by Joint Stock Companies is likely to develop rapidly.

In regard to selling farm products, the exorbitant difference in price between wheat and flour and between wheat and bread will result in the individual millers and bakers killing the goose of the consumer, and they will find that co-operation amongst the producers or the consumers, or the advent of large retailing Companies or Agencies willing to work for 6% or 7% profit, will take their trade away in the larger towns.

In the smaller towns and larger villages, co-operation amongst producers would, with any but the unprogressive, old type of English Farmer, eventually be the means of distribution where shopkeepers are unreasonable.

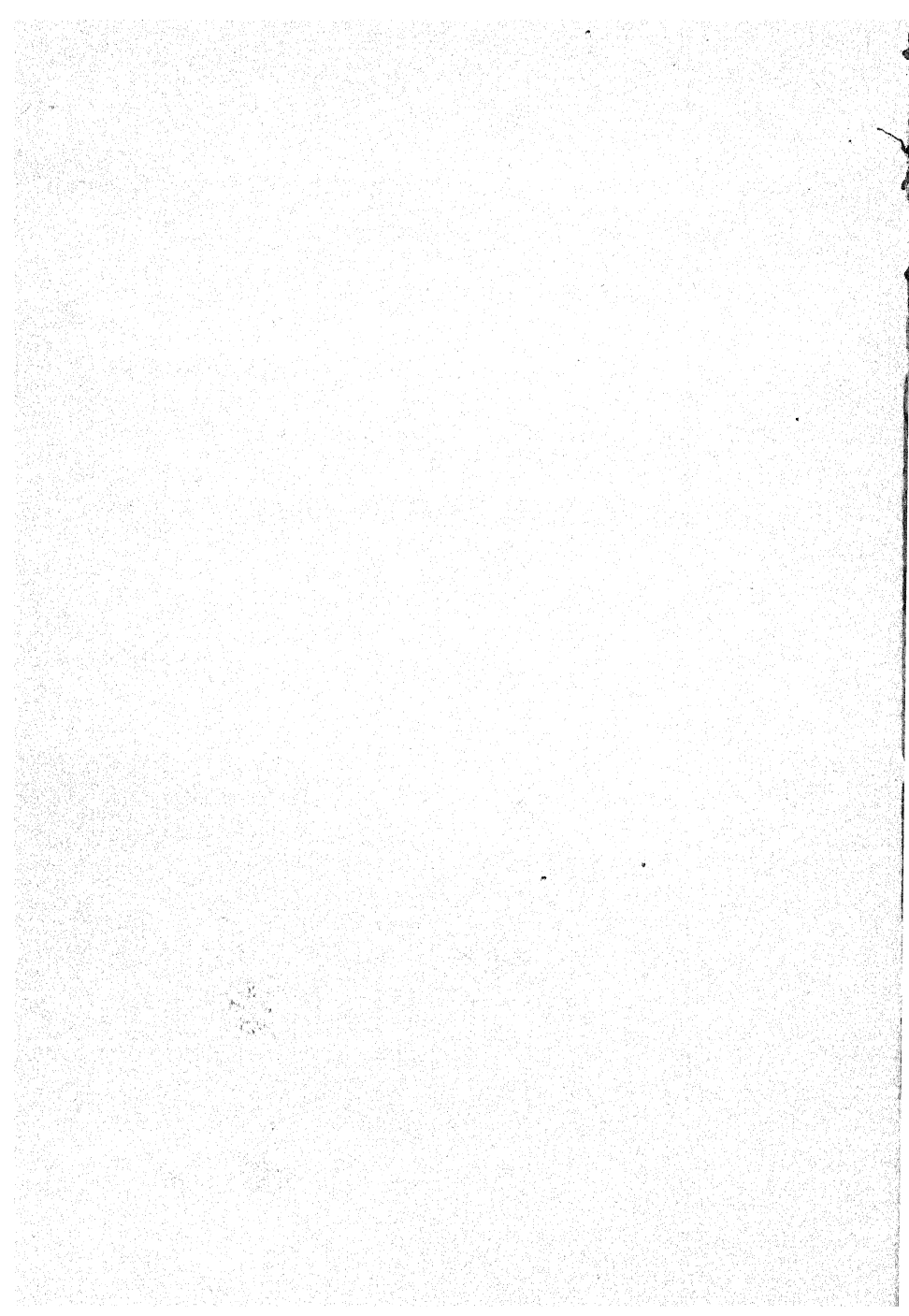
As, however, it will be a long time before co-operation becomes popular with a large number of Farmers, it may be that an era of distribution through the medium of an agent, paid by commission, in his nearest town or village, may be found as the best means by which the Farmers can meet the situation created by profiteer middlemen and muddling retailers.

The Farmers' Town Agent would receive corn, meat, dairy produce, poultry, vegetables, fruit, etc., from the farms, sell them at the best prices obtainable, and return the full value, less an agreed commission, to those who sent in materials. He would advise every farmer on his list what there was a shortage of, and about the prices being paid. He would also probably be the local agent for selling bread made by milling and baking Companies, operating on a large scale in the nearest big centre. His distributing vans could take meat, milk and bread, as well as vegetables, at one visit to the consumer's house.

It has been calculated that the cost of the waste of energy between the producer and consumer, through the multiplicity of middlemen, shops, unnecessary duplication of distributors, frequently amounts in money value to much more than all the farmer gets for his products. There is a reason for certain intermediaries and shops, but the competition between parasites, and in advertising and overlapping in distributing, is one of those evidences of bad organization, which thought, and system, can gradually remove. If the producer and the consumer divide the value of this waste between them, production would be greatly encouraged and the consumer would get his food probably at 20% to 25% lower prices.

CHAPTER VIII

LESSONS FROM ABROAD



THOSE who look to the development of British Agriculture on more intensive lines than practised in the past, may derive valuable information, by comparing our production per acre with what is regularly obtained in Foreign Countries, and considering the technical and economic causes which have accounted for the larger Foreign production.

TABLE XII

COMPARISON BETWEEN THE AGRICULTURE OF THE UNITED KINGDOM AND OF GERMANY AND FRANCE

	United Kingdom.	Germany.	France.
Total acreage under cultivation.....	48,000,000	86,000,000	67,000,000
Of which the acreage under plough is	20,000,000	65,000,000	47,000,000
Of which the acreage under grass is	28,000,000	21,655,000	20,000,000
Percentage of cultivated surface in grass	60%	20%	30%
Acres growing bread grain..	1,665,000	20,000,000	19,500,000
Percentage of area growing bread	3%	25%	30%
Total quarters bread grain produced	7,000,000	58,000,000	47,000,000
Production of bread grain per head of population.	90 lbs.	485 lbs.	500 lbs.
Head of cattle kept.....	12,000,000	19,000,000	13,000,000
Population, total	43,000,000	60,000,000	40,000,000
„ engaged in agriculture	1,350,000	10,000,000	8,000,000
Percentage of population engaged in agriculture.	3%	17%	20%
Bushels bread grain produced per acre of arable	3	8	8
Acres grass used per head cattle	2½	1	1½

German crops of grain were grown on 64% of their acres under the plough. Had the same practice been followed in the United Kingdom for a plough area of 24,000,000 acres, we should have grown 15,000,000 acres of grain crops. Our acreage of grain crops was only 8,000,000, half of which was oats.

* * * * *

Dealing with the relative progress of Agriculture in the United Kingdom as compared with Germany, the following Table is made up upon identical prices of the materials produced for both Countries, the quantities produced being those returned as the official outputs of each Country. It has seemed desirable to compare dates of twenty years apart, viz., 1893 with the year 1913.

TABLE XIII

RELATIVE VALUE OF TOTAL GRAIN AND ANIMALS PRODUCED IN THE UNITED KINGDOM VERSUS GERMANY

	UNITED KINGDOM				GERMANY			
	1893		1913		1893		1913	
	Million Qrs.	Million £.	Million Qrs.	Million £.	Million Qrs.	Million £.	Million Qrs.	Million £.
Wheat @ 40s. a qr.	7½	15	7	14	17½	35	22½	45
Rye " 30s. "					39	58½	53½	80½
Barley " 25s. "	9½	11½	8	10	12½	15½	19	28½
Oats " 20s. "	21	21	20½	20½	29	29	67	67
Potatoes @ 50s.p.t	38 Mil. Tons.	47½	35½ Mil. Tons.	44½	98 Mil. Tons.	138	162 Mil. Tons.	216
	5½	13½	6½	16½	35	87½	54	135
		61½		60½		225½		351
		128½		133		276½		343½

SUMMARY

	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Average obtained p. ac. from Grain & Potatoes ..	1 5 8	1 5 4	2 16 4	4 10 0
Average obtained p. ac. from cattle, sheep and pigs..	2 13 8	2 15 6	3 9 0	4 0 0
Total per acre ..	3 19 4	4 0 10	6 5 4	8 10 0

It is obvious from the two above Tables that, in the United Kingdom, our comparatively small output of bread grain is due to the very large proportion of our farm area that is under grass, but it is equally distressing to see that it takes 2½ times as much grass area to keep a head of cattle as it does in Germany.

Comparing the results of our farms in 1893 with those of Germany of the same year, it is somewhat surprising to find that even then the German output

was more than double the value per acre in direct human food of what was obtained from English farms. This may chiefly be accounted for by two causes :

1. The very large proportion under cereal production in Germany even then, and
2. The still larger proportion under Potatoes as compared with English practice in 1893.

In regard to cattle, on which we have so prided ourselves, the values obtained in 1893 were considerably less per acre in this Country than in Germany.

Comparing 1893 results with those of 1913 in each country, we find a slight drop in the output receipts from the plough farming of the United Kingdom, while the value from cattle production had only gone up the trifling sum of 1s. 10d. per acre, or 4%.

Germany, on the other hand, had already in 1893 learnt the lesson which has now got to be learnt by this Country, viz., that it paid to intensify home Agriculture. During the twenty years following 1893, without increasing her total cultivated area, she increased her grain-growing by 65% and her potatoes by 58% in quantity. On the other hand, England reduced the area devoted to grain-growing and did not increase the value of the output.

In cattle, the United Kingdom remained almost stationary in number during the twenty years, increasing only 7% ; and in pigs not increasing at all.

Germany increased the number of cattle by 15%. She, however, reduced the number of sheep, but found

out the great secret, viz., that, through the increase in the number of pigs, the very greatest economic results in meat production can be brought about. During those years, Germany doubled her pig population, and it was largely through the enormous stock of pigs and the fat with which they provided her human population, that she was able to continue the War for such a long period.

Dealing with the complete results, it is most distressing to find that the United Kingdom remained absolutely stationary during this twenty year period, while Germany, which started with a 50% greater output than ourselves in 1893, was able, through scientific management, physical energy and business thought, again enormously to increase, so that in 1913 her output per acre was 125% more than that of the average acreage of the United Kingdom.

Another series of statistics are available which compare the increase per acre as between 1890 and 1912 in Germany. Wheat increased in output during that period by 37%; rye, which is the chief staple bread food of Germany, 50%; barley and oats each increased 34%; potatoes 31%, while the hay crop, by careful dressings of fertilizers, had been got up by 29%.

Between 1884 and 1913, the United Kingdom grain-growing area had gone down from 10,000,000 acres in the former year to 8,000,000 in 1913. The potato area had also gone down 20%.

In some years, corn crops, sugar beet and potatoes for direct human food, occupied 75% of the ploughed land of a great part of Germany, and yet over the

whole country, including the grass, 40 cattle were kept for each 100 acres of Agricultural land.

Between 1890 and 1910 the consumption of Phosphate and Nitrogen went up in Germany from 1,600,000 tons to 6,000,000 tons, practically 300%, a result chiefly due to the spread of technical education amongst farmers, and the large supply of low-priced Phosphates.

In regard to agricultural labour in Germany, 80% of the labour employed is on farms of over five acres each. That is to say, it is not the small peasant, operating his one or two acres, that has made German agricultural success, although the remaining 20% of agricultural workers have done a fair share towards it.

The small-holders have largely occupied themselves in growing vegetables on the scale of whole fields, and nearly 1,000,000 acres of farm land is occupied in growing vegetables, in addition to the potatoes. German gardens and orchards have increased over 150% in area in the last forty years.

Pigs, too, have prospered in their care, the stock having gone up from 9,000,000 in 1883 to 15,000,000 in 1900, and up to the huge figure of 26,000,000 in 1913. England, over the whole thirty years, remained stationary at under 4,000,000 pigs.

It is well again to mention that, in the opinion of German experts, their soil and climate are not so advantageous for agricultural output as our own.

Germany's agricultural political party (perhaps Agrarian or Union is the better name), by education and propaganda, imbued the German people with the fact that Agriculture was essential for the country,

and also that Agriculture and Manufacture *must* go hand in hand. No Country can live in which the whole attention and assistance of the large majority of those who think and, therefore, of the Government, is directed to the one industry only, and none to the other. The whole people of Germany made it their business to help Agriculture, being convinced that intensive cultivation was necessary and that home production in the end meant a sure and certain source of food, which, when all the money spent on food remained in the country, was, so far as the whole Nation was concerned, a cheap source of food. Moral support of Agriculture and, to some extent, Government support, developed and spread scientific knowledge of farming. With such a big body of thought in favour of Agriculture, unlimited capital became available.

Enormous German Companies to produce Sugar beet and manufacture Sugar were financed with ease. Big Co-operative Societies amongst the farmers themselves have everywhere been the successful means of purchasing wholesale what the farmer needs, and supplying what the farmer grows to the consumer's markets.

The German Chancellor, dealing with the question of Agriculture, several years before the War, pointed out that he has been convinced that vigorous Agriculture was necessary for the economic, the national, and the social, welfare of the State. Without a great and flourishing Agriculture, side by side with industry, factories would soon use up the best forces of the Nation.

In 1906, a German Commission showed that the proportion of physically fit men was :

(1) For the large cities.....	65
(2) „ „ small country towns	83
(3) While in the country districts the number was.....	114

Of the parents of the fit men, less than 2% were from the large towns, the rest either coming from the country, or the small country towns.

* * * * *

It is not so much that the British Farmer falls behind Continental practice in his technical operations, as that he has not been induced, or shown why, or shown how, to crop his land more intensively. In regard to the Nation's requirements, he tills far less than one-third of his farm land that is capable of and suitable for plough cultivation. The German, on the other hand, tills two-thirds of his.

Again, the British farmer is far behind Germany, France, Belgium, Denmark, Holland and even Spain in his use of fertilizers.

These remarks about the British farmer, however, must not be taken as criticizing everyone who is managing farms. There are, in almost every large district, a larger or smaller number of really good farmers, and if only the whole body had been following the practice of the best, the last twenty years

would have seen as great a development in British Agriculture as has taken place amongst our Continental neighbours. Unfortunately, the cry for cheap bread for the cotton workers, and the want of strong men in the Country and in the House of Commons, to develop and support a policy of progress in British Agriculture, has caused what can only be looked back upon as the devastation of our true National interests.

Denmark may be instanced as a country of progressive Agriculture. Thirty or forty years ago, it was one of the poorest little States of Europe, but its people—having no other interests of importance, took hold of Agriculture, and, even before the War, it had become rich, and everyone—be he labourer, farmer, landowner, or shipowner—was prosperous.

The Danes have made their success through the production of meat and dairy produce, by farming almost their entire area under the plough and by doing this with increasing intensity. Their success has enabled them to export as much as £23,000,000 worth of bacon and pig meat, butter and cheese in a year to this Country alone.

They have not, however, contented themselves with getting more out of each acre of soil, but have so improved their breeds of cattle and pigs as to obtain from each cow a greatly increased quantity of milk, and from each pig a larger proportion of high priced bacon from the amount of food supplied to the pigs.

The actual Milk records are kept in Denmark of

about 40,000 cows. The average Milk from all recorded cows in

1900 was 682 gallons Milk and yield of Butter 255 lbs.

1905	„	724	„	„	„	„	„	279	„
1912	„	766	„	„	„	„	„	301	„
1916	„	794	„	„	„	„	„	323	„

TABLE XIV

TABLE SHOWING INCREASE OF YIELD OF WHEAT IN BUSHELS PER ACRE IN PROGRESSIVE EUROPEAN COUNTRIES

Country.	Yield of Wheat in Bushels per Acre.			
	1886 to 1890.	1896 to 1900.	1901 to 1905.	1920, 1921.
Belgium.....	27	29	34	35
Denmark	35	41	40	51
France	18	19	20	23
Germany	20	27	28	30
United Kingdom	30	32	32	32
Holland	28	30	33	49
Spain	9	11	13	14
Sweden	23	26	25	35

Of the arable land cultivated in Germany as much as 84% is often used for growing corn crops and potatoes. Whole provinces of 5,000,000 acres, average 75% in these intensive crops, that is, their arable is chiefly devoted to producing direct human food rather than to un-intensive cropping. In the United Kingdom the percentage of corn and potatoes to total arable is only 47%, and our corn and potato growing is not quite 20% of the total cultivated land that is arable plus the permanent grass.

At the same time, the Germans intensified their

meat production, increasing it from 1,500,000 tons of animals slaughtered in 1890 to over 3,000,000 tons in 1910.

In regard to milk and its products, the pre-war value of German outputs is stated at £150,000,000, while the United Kingdom Census of value of milk, butter and cheese produced was only £30,000,000.

It may be interesting to glance at the size of farms in Germany and their farmers' practice regarding the proportions of different crops grown on small, medium and large farms respectively :

						Acres.
Only 1%	of the cultivated area is in farms of under					1
" 5%	"	"	"	"	"	1 to 5
" 10%	"	"	"	"	"	5 " 10
" 35%	"	"	"	"	"	10 " 50
" 27%	"	"	"	"	"	50 " 200
" 22%	"	"	"	"	"	Over 200
That is to say 84% is in farms of over 10 acres						
"	"	50%	"	"	50	"

The following are the *percentages* of each kind of crop grown on German farms grouped as to size of holding :

Farms of	Corn crops.	Sugar beet.	Potatoes.	Forage crops.	Rotation grasses.	Number of animals per 100 acres.	
						Cows.	Pigs.
Under 1 acre	23	.5	67	3	.3	120	1,400
1 acre to 4 acres	49	.9	34	8	1.0	150	450
4 " 10 "	59	.8	19	11	2.0	150	235
10 " 40 "	64	1.0	12	11	3.0	95	150
40 " 200 "	62	1.7	8	10	7.0	60	100
Above 200 "	57	4.8	11	11	5.0	35	50

Pigs and potatoes are the bases of profit of most of the small farms, while grain and sugar-growing make most of the profits of larger farms.

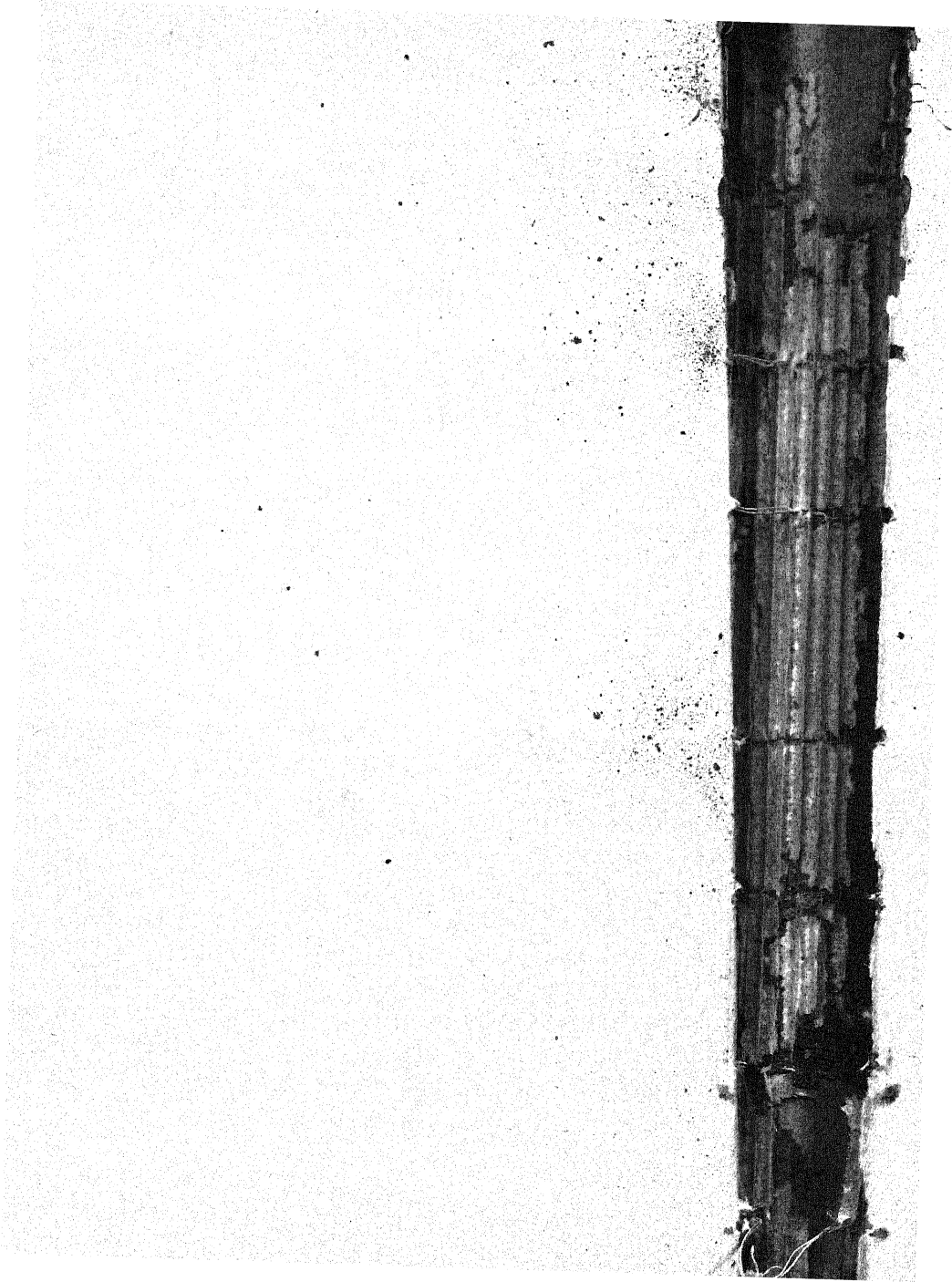
A committee of 16 leading German Specialists, reporting to their Government in 1915 on methods by which Germany could get enough food during the War, stated, amongst other things, that :

“ The enormous expansion of our Agriculture in the past is largely due to the introduction and employment of artificial manures, which have caused the greatest change in farming and given the greatest impetus to it. Latterly have also come improvements in plant culture and better working of the ground, and the fighting of plant diseases, etc.

“ We have tried to estimate to what degree each factor has contributed to increase harvests, and have come to the conclusion that the employment of artificial manures has contributed about 50 per cent., the cultivation of more prolific crops 30 per cent., and other measures 20 per cent.

The advanced Agriculturists of Germany claim that even the high results reached now are only a step towards the highest possible output of corn crops which they will attain when they near the maximum.

CHAPTER IX
COUNTY BY COUNTY



PREVIOUS Chapters have dealt with questions of intensifying the output by improved methods of cultivation and improved fertility and the advantages of breaking up grass land. The question of the areas which could, with advantage, be put under the plough has now to be dealt with.

Critics of increased plough cultivation have based their chief argument upon the unsuitability of land now under grass for plough farming. Had they based their opposition on the fact that human beings are creatures of habit; that a large portion of them are physically lazy; that many prefer to go on in old ruts rather than try modernized methods, even when there is a chance of there being large additional profits, they would have been nearer the truth.

For the purpose of aptly illustrating how profitable to the Nation as a whole some Counties now are, and how unprofitable others have remained, it may be suitable to take as an illustration two English Counties which are next to each other in alphabetical order. They are neither quite the best Counties, nor quite the worst in England, from the point of output, but Suffolk is almost at the top of the list, while Somerset ranks only three from the worst.

If we add together the home production of food

and the total imports of all kinds of food, and then assume that each County should produce its proportion of the Nation's food in relation to its actual cultivated area, we find that the output of food in Suffolk was actually 100% of what it should have produced to make England self-supporting. Somerset, on the other hand, gives less than 50%.

There are three Counties, the output of which would give an exportable surplus of food from England if all the other Counties were producing their share of the requirements of the British Isles.

The diagram (see frontispiece), on its right-hand side shows the actual proportion of the requirements of the United Kingdom that each of the Counties did produce of total food (other than poultry, fruit and vegetables) which the United Kingdom consumed. On the left-hand half of the diagram the proportion of plough land is shown slightly dotted, while the proportion of the cultivatable area of the County left down to grass is shown in dark hatching.

The two halves of the diagram are purposely put side by side as it will enable the reader at a glance to realize, in the fullest manner, how the output of food of a County in practically all cases is in almost exact relation to the amount of its ploughed land.

The order of the Counties on the diagram is given in relation to the proportion of land used as grass.

The Counties which devote much of their land to grass are the ones which are doing little towards the production of England's food. There are excuses

for a few of the Counties by reason of their mountainous nature. Westmorland, Monmouth and Derbyshire have some excuse from this reason, but the other Counties producing less than 70% of what they ought, Somerset, Warwick, East Sussex, Gloucester, Wiltshire, Surrey, Leicester, Oxford and others, have little excuse from this cause.

The farmers of these nationally bad Counties will probably excuse themselves on the ground of heavy land, or less suitable climate, but, with the advent of Tractors, the former, if it ever was a valid excuse, is far less so now, and, as to climate, it will be seen that the average yields of wheat, barley, turnips, hay, per acre, over ten years, show trifling variations in the bad Counties, as compared with West Suffolk, viz. :

	Average output per acre over ten years.			
	Wheat.	Barley.	Turnips.	Hay from permanent grass.
	Bushels per acre.	Bushels per acre.	Tons per acre.	Cwts. per acre.
West Suffolk ..	30.81	32.33	11.68	20
Somerset	30.83	32.66	11.32	25
Leicester	30.41	31.69	11.94	21
Cornwall	29.66	32.65	15.07	28
Warwick	30.23	32.28	13.12	22
East Sussex	32.93	33.54	11.21	22
Gloucester.....	29.70	30.51	13.93	23
Wiltshire.....	31.74	31.31	14.18	24
Surrey	30.23	30.28	10.92	24
Oxford	30.77	32.67	13.10	22

Statistics are available of each County of England divided up into various divisions. These when

examined show that, while the Counties with a total satisfactory output are well farmed throughout, yet the bad Counties are cultivated in a very irregular manner, some areas in nearly all the Counties being quite good.

Even in Somerset, one of the divisions contains 40% of ploughed land, but also it has one division with only 4% ploughed, which is practically the record of unintensive farming in the Kingdom.

Cornwall has three divisions of over 65% Plough land.

Gloucester has three divisions which are over 60% of land as arable.

Wiltshire has two divisions over 55%.

Oxford has three divisions over 60%.

In regard to land actually under grain crops, the whole of Suffolk has eight divisions with over 50% of the cultivatable land intensely cultivated under corn crops.

In Somerset, which is about the same size, there is only one division that even reaches 25%. All the other divisions are bad, but the Frome, Shepton Mallet, and Templecombe divisions, which have a total of 110,000 acres of land under crops and grass, grow only 3,700 acres of corn between them. These three divisions are some of the best land in the British Isles, entirely suitable for plough cultivation. From the National point of view, what must be called the bad and lazy habits of the farmers prevent these areas from producing anything towards the National food supply.

Somerset prides itself on being a milk-producing

County. Do the farmers there realize that their average is only 509 gallons of milk from each cow yearly, while in Suffolk, which devotes itself to more intensive plough cultivation, the cows are better fed and give, on an average, 622 gallons per year?

Calculated on prices equal to 40 shillings per quarter of wheat and corrected to the same area, the value of the farm products from Suffolk in a year will exceed those of Somersetshire by £700,000.

It should be noted that the west half of Suffolk is 78% plough land, while the east half of Somersetshire is only 9% plough land.

If we divide the Counties into three classes according to their production, Cornwall is in the top class, while Somerset is in the bottom of the last class. This fact indicates that it is not a question of western rainy climate which governs intensive cultivation. The figures for the output of Cheshire and Devonshire also show that the western climate is not answerable for the backwardness of Somerset.

The figures for the average production are available for different groups of English Counties, and, in the following Table it will be seen that the Western Midland Counties in one group and the South-Western Counties in another, give no worse yields *per acre* than do the rest of England :

TABLE XV
YIELDS PER ACRE FOR AVERAGE OF YEARS 1903 TO 1912

	Wheat.	Barley.	Oats.	Pota- toes.	Hay from permanent grass.
	Bushels.	Bushels.	Bushels.	Tons.	Tons.
Whole of England	31	33	41	6	24
Eastern counties . .	31	32	44	6	21
N. Eastern „ . .	33	33	46	6	23
S. „ „ . .	31	33	43	5½	22
E. Midland „ . .	31	33	37	5½	22
W. „ „ . .	30	31	38	5½	22
S. Western „ . .	30	32	40	5½	22
Northern „ . .	31	34	38	5½	24
N. Western „ . .	33	32	39	7	30

How much of the total acres of the farms in the various Counties grouped under the above Divisions are used for corn growing is worth considering, viz. :

	Percentage of corn crops to total farm area.	Percentage of plough land used for corn crops.
	%	%
Eastern counties	42	64
N. Eastern „	40	59
S. „ „	23	52
E. Midland „	21	60
W. „ „	16	52
S. Western „	16	45
Northern „	17	55
N. Western „	15	53

If Cornish farmers would give up their unintensive habit of growing nearly 150,000 acres of Rotation Grasses on plough land and devote that land to wheat and other corn crops, they would rapidly rise towards the top of the County Class.

Comparing the Counties in the order in which they

contribute to the National food supply, the next Table will be of interest and it will be seen that Cambridgeshire, the Isle of Ely, are at the top of the list, although the cultivated area of Suffolk produces its full 100% of the corn, meat and dairy produce that the whole Nation needs. Lincoln and East Yorkshire practically produce their share of the Nation's requirements. Everything calls attention to the fact that when only a small percentage of farm land is used as grass, the production of food of all descriptions is correspondingly high. It is not the soil or the climate, but the character and habit of those who will not till the land at all intensively that gives low outputs from the bad Counties.

So as to arrive at a comparative result as to what each County was doing towards providing the total food needed for the consumption of the whole Country, the food produced and that imported was added together and taken as the total requirements. The quantity of food produced in each County was then carefully ascertained and the relation that the cultivated area of each County bore to the total farm land of all the Counties was used to arrive at what may be called "*the quota*" each County should supply to make up all the food we need :

TABLE XVI

TOTAL PRODUCTION OF ENGLISH COUNTIES, COMPARED WITH THE QUOTA
REQUIRED FROM EACH, ASSUMING THE UNITED KINGDOM PRODUCES ALL
ITS FOOD REQUIREMENTS

County.	Percentage of food produced by the county in relation to its quota.	Percentage of grass land to total farm area.
Cambridge and Isle of Ely.....	108	19
Suffolk.....	100	23
Lincoln	97	31
Yorks, E. R.	97	31
Essex.....	91	33
Norfolk	91	25
Herts	90	35
Bedford.....	76	39
Cornwall	76	41
Chester	75	57
Hunts	74	37
Berkshire	70	46
Hants and Isle of Wight	70	39
Notts	70	47
Oxford.....	70	49
Yorkshire, N. R.....	66	58
Devon	63	54
Dorset	63	61
Kent	62	54
Lancs.....	62	61
Northants and Peterborough.....	62	62
Rutland.....	62	60
Wiltshire.....	61	58
Durham.....	60	62
Bucks	59	63
Salop	59	66
Leicester	58	73
Sussex	58	58
Hereford	57	66
Stafford.....	56	69
Yorks, W. R.....	55	64
Cumberland	53	60
Derby	52	77
Surrey	52	57
Warwick	51	69
Gloucester.....	50	63
Worcester	50	64
Somerset	50	77
Monmouth	42	78
Northumberland	42	70
Westmorland	37	80

Dealing with England, the total arable land of the English Counties only was 10,361,000 acres in 1913. The grass land consisted of 14,000,000 acres. That is to say, 58% of the English County areas on the average was down in grass. The Food Production Department Campaign altered this somewhat and, by adding to the plough land, considerably reduced the grass area in England. The dozen best English Counties had practically no grass in excess of one-third of the total farm area. In the ten Counties adjoining the best Counties there was, however, a surplus area of grass of 1,300,000 acres above a reasonable one-third. In the fifteen Southern and Western Counties, there were 2,000,000 acres down to grass in an excess of one-third of the farm areas, while for the twelve Counties making up the remainder of England, there was an additional 2,000,000 acres.

Most farmers will claim that they must have a proportion of their land in grass. Except in hilly, or marshy, ground, it would be unreasonable to assert that the percentage of grass must or should exceed one-third of the total farm if a moderately intensive plough policy is adopted.

After the breaking-up programme during the War, there still remained in the English Counties a surplus of 5,000,000 acres over and above one-third of the farming area.

Some agricultural specialists have argued that land north and west of a certain line should be left out of any more intensive programme than is at present carried out. This line, starting at Newcastle and going through Bristol, still leaves 4,200,000 acres of

grass land to the south and east of that line which is in excess of one-third of the cultivated area of the total acreage included, which area is more than ample, if broken up and properly cultivated, to supply the food we now import.

When it is remembered that in 1875, in England and Wales alone, there were 2,400,000 acres of ground ploughed up which has been put down to grass after that date and remained down at grass even after the 1917-1918 Food Production Programme, it will be obvious that there is an enormous area of land which, having formerly been under the plough, is suitable for and will be broken up again, provided the farmer, and farm labourer, are secured a living wage.

Taking a few of the Counties indiscriminately, the acreages laid down to grass after 1875 are as follows :

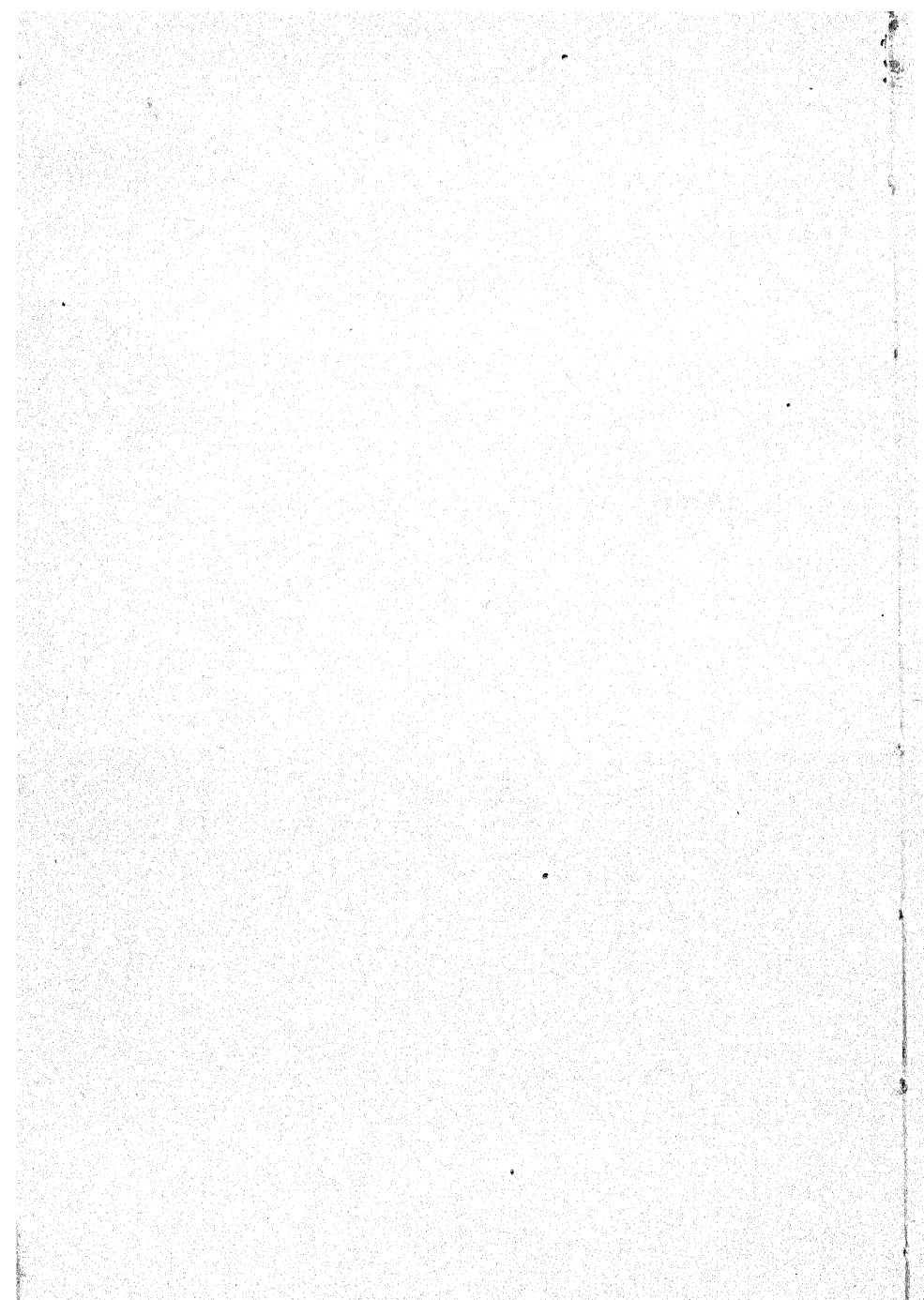
	Acres.
Gloucester	130,000
Hampshire	130,000
Herefordshire	100,000
Kent	150,000
Leicester	100,000
Northumberland	150,000
Shropshire	140,000
Somersetshire	170,000
Warwickshire	120,000
Wiltshire	150,000
Worcestershire	120,000

Even Cambridgeshire, Lincoln, Norfolk and Suffolk, amongst the very good Counties, somewhat increased their grass area during that period. Cheshire is practically the only County in England which is no worse in respect of grass area than it was in 1875.

From the above it will be realized that our climate or want of available area of suitable land are not causes that will prevent England producing her own food.

CHAPTER X

CATTLE AND SHEEP—MEAT, MILK, BUTTER AND CHEESE



THIS Country paid for imported meat, in a normal year, the sum of £56,000,000. This includes £32,000,000 paid for imported pork and bacon. The pig question will be dealt with very fully in a later Chapter, and this one chiefly deals with Beef, Mutton, Milk and Butter.

The animals sold off all the British farms in a pre-war year brought in to the Farmers a total amount of £61,000,000. The Farmers also obtained for milk £25,000,000, and we imported only £2,000,000 worth of that article.

The Farmers sold in addition £3,000,000 in butter and £1,500,000 in cheese and the Country imported £24,000,000 worth of butter and £7,500,000 worth of cheese.

In round figures, therefore, the British farmers were obtaining £76,000,000, while foreigners were getting from what they sent us £57,000,000 for Beef, Mutton, Milk and its products.

This is a very bad showing, but a better proportion than our Plough Farmers' sales of cereals, which only amounted to £36,000,000, while we imported £84,000,000 worth of cereals, including flour.

As will be seen from the above, there is ample room for an enormous and profitable home development of output in meat and milk production, as, for example,

by growing the 1,200,000 tons of meat we import, but there has been little sign of improvement of production, while, on the other hand, there has been a steady increase in imports, as shown in the following Table :

TABLE XVII
IMPORTS (IN MILLIONS OF POUNDS STERLING)

	Beef.	Mutton.	Pig Meat.	Total.
1900	10	6	17	33
1905	11	7½	17	36
1910	13	10	17½	41
1913	20	12	22	54

Since the War, the values of the meat and pig products have more than doubled the 1913 figure.

As to exports of Cattle, many people imagine that this Country makes very large profits out of selling pedigree stock. It is a nice, profitable business for a few individuals, but the total export value is only about £150,000 a year, of which we received only £20,000 from Foreign Countries, the rest coming from our own Colonies.

In regard to stocks of cattle in the Country, our progress is not very satisfactory.

The total number of animals in Great Britain was :

Cattle	.....1884.....	6,300,000
„	.....1900.....	6,800,000
„	.....1913.....	6,900,000
„	.....1920.....	6,700,000
Sheep	.....1884.....	26,000,000
„	.....1900.....	26,000,000
„	.....1913.....	24,000,000
„	.....1920.....	19,700,000
Pigs	.....1884.....	2,600,000
„	.....1900.....	2,400,000
„	.....1913.....	2,200,000
„	.....1920.....	2,100,000

Since the great fall in the acreage of the plough land during the last twenty years of the last century, the production of meat and milk has increased in this Country very slightly, but the figures show that increased output of meat has come entirely from the improvement of the breeds of cattle and none of it from addition to our flocks and herds.

It is rather a shock, after seeing the enormous increased production of Cereals which took place in Germany in the thirty years before the War, to find that they also much more than doubled their output of meat, which went up from 1,300,000 tons in 1883 to over 3,000,000 tons in 1913.

Their Beef production was up	92%
„ Veal „ „	143%
„ Sheep „ „	53%
„ Pork Products (the largest of all) was up	182%

That is to say, in regard to pork, they killed 700,000 tons in 1883 and 2,000,000 tons in 1913. The German pig population increased in this century alone from 16,000,000 in 1900 to 26,000,000 in 1913.

We can learn a lesson from their increase in veal consumption, the fact being that the length of time a calf has lived before it is ready for killing for veal is so short that it consumed proportionately little food for the maintenance of heat in the body, as compared with a beef steer, which has had to expend food energy to keep itself warm for nearly three years, instead of, as in the case of the calf, three months.

Another factor to be remembered, and made use of in future, in food economy is the fact that if we must have beef, we can produce what is called "Baby Beef" from a young steer of, say, twenty months old, much cheaper than we can from a big ox of over three years old.

The butchers, of course, want to buy highly-fatted cattle, because the fat cattle, when killed, give 70% beef; half-fat cattle, 60% and lean cattle, 55% of meat.

At the Smithfield Shows, on an average of four years, Shorthorn fat cattle two years old weigh 1,400 lb. and three years old, 1,800 lb. The cost of putting on the last 400 lb. was excessive.

Up to two years old Shorthorn and Angus Cattle can add about 2 lb. per day of live weight to their carcass, but after two years the addition is much smaller.

* * * * *

KINDS OF CATTLE

From a general point of view, Shorthorns are the best all round cattle. They grow into a large quantity of very good beef, and at the same time, are fairly large milkers (a good Shorthorn cow will average 26 lb. a day), and the milk is of good quality, being about 3.7 of fat.

Holstein cows give larger quantities of milk, about 32 lb., but the fat in it is only about 3.1. This breed is, however, said to be improving as to quality of milk.

The Jersey cow is the best for quality of milk, the fat being over 5, but only gives about 20 lb. a day. The meat, on the other hand, of a Jersey cow is not highly appreciated by the butcher or his customers.

The average quantity of milk given per year by all classes of cows, in England, has recently been computed officially, as follows :

	Gallons.
1908 Census Return	550
1909 to 1913	560
1914	575
1915	550
1917	495
1918	486
1919	470

This fall in the output of milk of average cows is probably accounted for by the scarcity of rich oil cake during the latter part of the War, but the very low price the farmer obtained for milk in 1920-21-22 has further reduced the quantity of milk available.

It may be pointed out that, while the farmer has to sell his milk on contract to the London Combine, or association elsewhere, which regulate the price to the consumer, the Farmer has been receiving, during the last year or more, only 2½d. a quart for the spring and summer months, 3d. for the mid-summer and autumn months and 4d. for other months. These prices are for the milk delivered free by the Farmers at a London Station, carriage paid. He has the whole cost of keeping cows for three years or more before he gets any milk from them, of feeding the cows very heavily on expensive materials, with

enormous costs for labour in milking and attending the cattle. On the other hand, the Milk Combine sell to the London consumer at 6d. a quart in summer and 8d. a quart in winter. They thus receive from the public, roundly, more than double the price they pay the farmer, and all they do is to send boys round with the milk once or twice a day. The distributor is worthy of his hire, but, as shown in a later Chapter, with proper organization, there is sufficient margin between the producer's and consumer's prices to pay a reasonable cost and profit to the distributor and yet reduce the price paid by the consumer by nearly a third. At the same time, an increase should be received by the farmer, say of the other third, thus giving him some profit, instead of leaving him with the loss he at present sustains when all his costs are added together.

While on the subject of prices, it may be pointed out that to-day, the British farmer is receiving on the average rather under 9d. a pound for the dressed weight, i.e., meat weight, of his best cattle. The butcher is charging 2s. 2d. for good joints, 2s. for others, and, on an average, is receiving 1s. 6d. for the whole dressed carcass, in addition to getting the hide, which more than covers the cost of killing. Here again, with proper organization, there is ample room for a good living for the butcher, a reduction of at least 6d. a pound to the consumer, and an additional price to the grower of 2d. a pound, which would make producing English beef a reasonable, though not a too remunerative business for the British farmer.

Official figures of the price of English-grown dead meat for many years past are available, and, in regard to the period 1905 to 1913, the following are the average prices when buying the whole carcass, viz. :

		s. d.		d.
English beef	per cwt.	54 0	i.e. about	5 $\frac{3}{4}$ a lb.
„ mutton.....	„	67 8	„ „	7 $\frac{1}{2}$ „
British pork.....	„	64 0	„ „	7 „
Bacon (Irish) (unsmoked).	„	70 0	„ „	7 $\frac{1}{2}$ „
Irish smoked hams	„	105 0	„ „	10 $\frac{1}{2}$ „

The farmer to-day would lose a considerable amount by selling at these prices because his labour and all costs are much higher than they were before the War, but as costs come down, the price the consumer has to pay now, can, with proper organization, fall very considerably.

The use of livestock is really to convert plants unsuited for the direct use of man into human food, and is the only way of making use of such land as cannot be tilled by the plough, such as mountains, heaths, wet pastures, marshes and the like. Cattle are also essential for the production of milk, butter and cheese, though for producing fat, as will be seen in Chapter XIV., pigs are much more economical.

* * * * *

MILK

Under the microscope, milk is a colourless liquid containing globules of fat. About 85% of milk is water and 12 to 14% are solids, and of the whole

weight $3\frac{1}{2}\%$ in a poor cow's milk to 5% in that of a really good cow is fat.

Cream, on the other hand, is between 55 and 70% water and contains 25% to 40% of fat. Cream is, by volume, about 10 to 14% of the milk from which it is taken. Cream got by a mechanical separator, however, takes practically all the fat that was in the milk, but leaves, in the skim milk, valuable feeding properties for calves and pigs. The first quart of milk drawn from a cow during milking is very low in fat, containing little over 1% , while the last pint drawn at a milking has often as much as $7\frac{1}{2}\%$ of fat.

BUTTER AND CHEESE

One hundred pounds, i.e., 10 gallons, of milk are required for making $3\frac{1}{3}$ lb. of butter, and from the residue of such milk, 6 lb. of skim-milk cheese can be made. A good cow ought, if all her milk is used for butter making, to give about 300 lb. of butter a year.

One hundred pounds of milk will make 10 lb. of ordinary ripe Cheshire cheese. A cow should, therefore, produce about 5 cwts. of cheese a year, which, at the pre-war price of $6d.$ a lb., would be worth $\pounds 14$.

Two pounds of milk, which is rather less than a quart, contain the same amount of food as 1 lb. of beef.

* * * * *

SHEEP

From the National point of view, sheep ought not to be looked upon as a very valuable asset, that is to say, while they have their uses, they should be looked upon as only of about 1 or 2% in value, in relation to the whole production, or output, of the Nation's food.

Were it not for their luxury value, because of the flavour of mutton, and for their wool growing, they are relatively very uneconomical. They have the advantage that they gather their food on steep hills, downs, sides of mountains, and heaths, where only small quantities of food are grown to the acre and where only long four-legged animals of a moderate weight can graze with comfort.

Some farmers still look upon them as a means of conveying manure to plough land on which turnips are grown, and feed the sheep on them in temporary folds, adding some oil cake to the food. Sheep do tread some kinds of light soil into a better mechanical condition and are valuable for that purpose. The only manure they really supply is that part of the added cake not used by the sheep in its own growth. It is every day becoming more evident that it is uneconomical to feed cake to animals to make manure, as compared with purchasing artificial concentrated fertilizers.

Again, a ewe has only one lamb a year and, in this respect, is most uneconomical as compared with a sow, who may bring up thirty to forty pigs before she is the age of a two-year-old ewe.

One pound of pork is also produced with rather less than half the quantity of food needed to produce 1 lb. of mutton. While, therefore, a few sheep will always be an economy for downs and heaths, English farmers will probably realize, as the other countries of Europe have done, that their flocks of sheep should be reduced, and their pigs increased.

The following Table illustrates what other countries have realized in this respect and how they have reduced their sheep, in some cases almost to vanishing point, while increasing the pigs, in the case of Germany, nearly four times.

TABLE XVIII
NUMBERS IN STOCK (IN MILLIONS)

	Cattle.		Sheep.		Pigs.	
	1873.	1913.	1873.	1913.	1873.	1913.
Germany	15	20	25	2	7	26
France	11	15	24	16	5	7
Belgium	1	2	$\frac{1}{2}$	nil	$\frac{1}{2}$	$1\frac{1}{2}$
Hungary	5	7	15	8	4	8
Denmark	$1\frac{1}{2}$	$2\frac{1}{2}$	1	$\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$
U. K.	10	12	33	29	3	3

INCREASE REQUIRED FOR THE UNITED KINGDOM

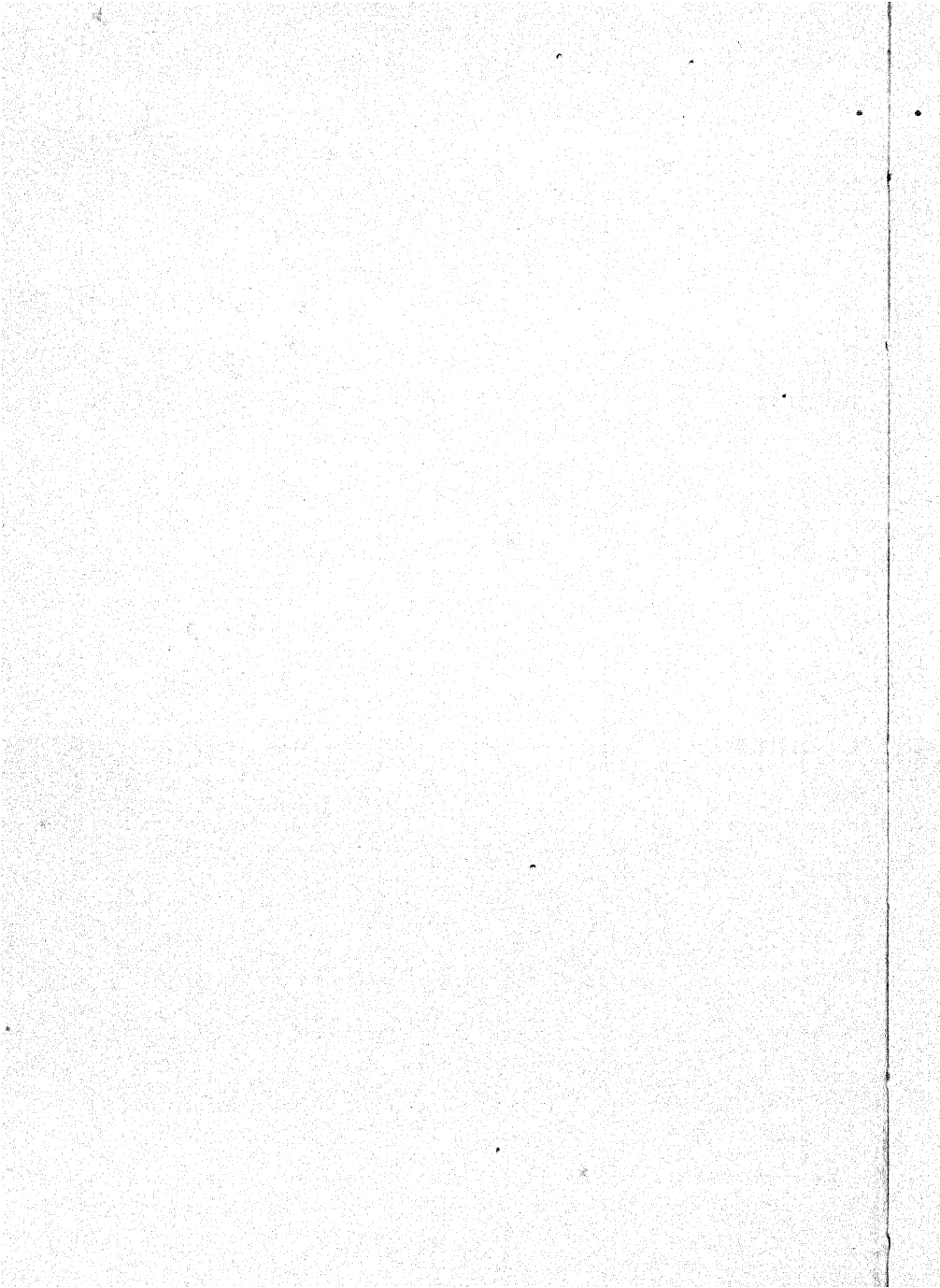
To produce our own requirements of beef and milk, we must increase the stock of cows by somewhat over a million, and must, at the same time, improve the breed of cows, so that the average milk per cow reaches at least 650 gallons per annum. This production of milk would enable us to replace by the

home-grown butter at 1s. per lb. the £25,000,000 worth of butter we imported in normal times. The progeny of this extra million cows will, with the increased output of pigs spoken of in Chapter XIV., supply all the meat needed. The food for the extra million cows and their progeny will be found by ploughing up the proposed additional acreage of grass land.

If average arable plough land is cropped with the special object of growing cattle food only, 100 acres will produce the food for 50 cattle. At present 100 acres of ordinary grass land will not keep more than about 25 cattle.

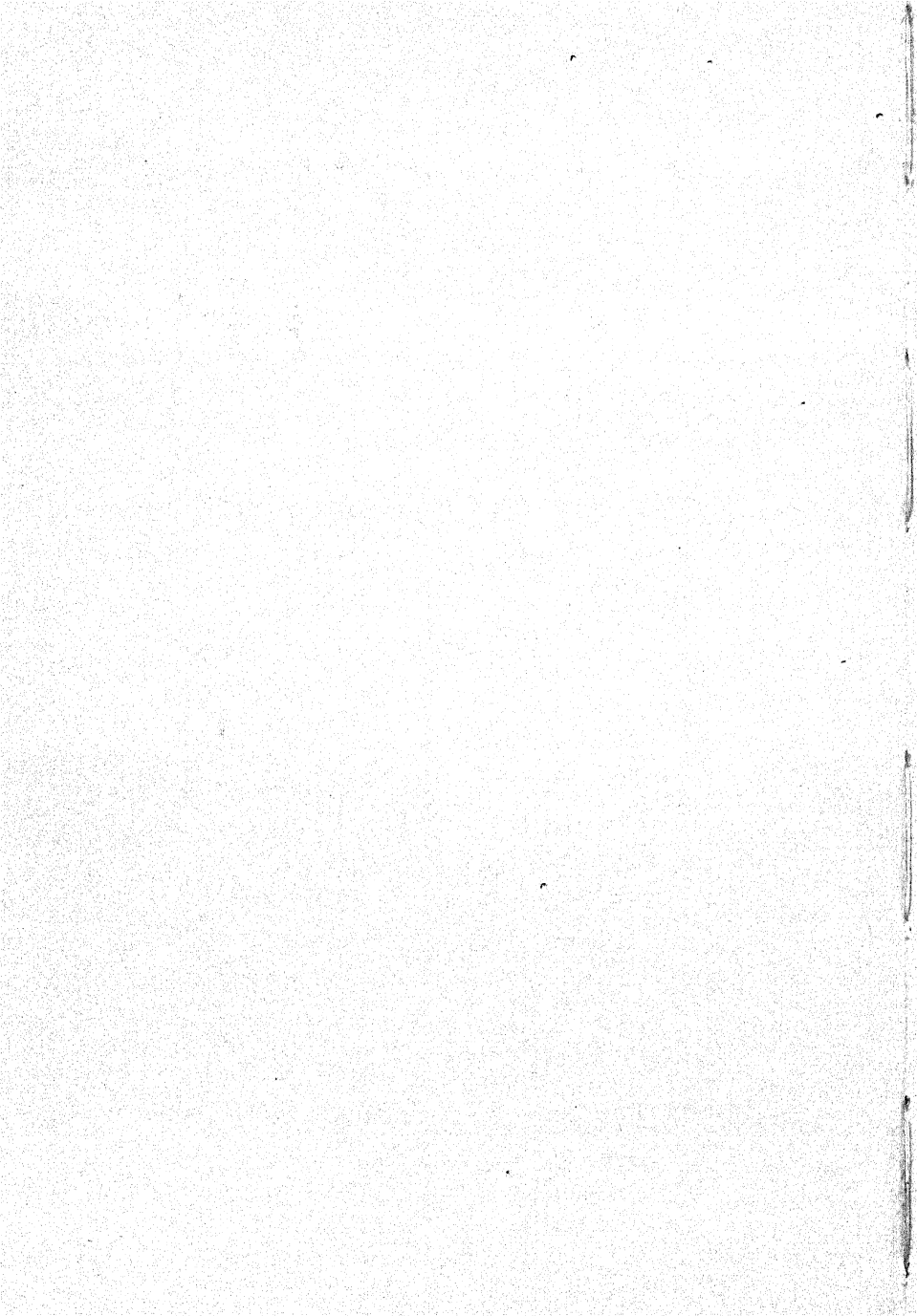
MARKETING

A section dealing with this at the end of Chapter XI. may be of interest, as well as the whole of Chapter XVIII. on the Housewife's Problem.



CHAPTER XI

FRUIT AND VEGETABLES



FRUIT and Vegetables would seem to be essentially products of the soil in regard to which this Country ought to be self-supporting, and it is, therefore, somewhat astonishing to find that, excluding potatoes, we produced, at pre-war prices, only £2,000,000 worth of vegetables and £4,000,000 worth of fruit and flowers.

On the other hand, we imported in 1913 :

	£	£
Onions	1,035,000	
Tomatoes	1,348,000	
Other vegetables	519,000	
	<hr/>	2,902,000
Fresh flowers		288,000
Apples	2,230,000	
Cherries	123,000	
Currants	147,000	
Gooseberries	6,000	
Grapes	740,000	
Fresh nuts	1,782,000	
Pears	650,000	
Strawberries	25,000	
Plums	437,000	
Other fresh fruit	325,000	
	<hr/>	6,465,000
Jam and preserved fruit		1,187,000
		<hr/>
Total		10,842,000
		<hr/>
Potatoes		2,590,000

Oranges, lemons, bananas and other semi-tropical fruit which we cannot grow, are not included in the

Table, but there is no reason why apples and other fruit properly grown at home, and properly stored, should not take the place of a good part of this kind of imported fruit, for which in 1922 we were paying over £14,000,000 to Foreign Countries.

The acreage required for intensive vegetable and fruit growing, if taken out of the total cultivated area of the United Kingdom, would amount to well under 1%. Fruit and vegetable growing is so intensive that it will give a very big yield per acre and employ a large number of men and women profitably on a small area.

There is also such an enormous demand for vegetables that we ought to grow far more, especially by intensive cultivation in fields. People ought to eat much more vegetables than they do, but the present retail prices make them almost prohibitive to a workman's household, living in the town. Produce double the quantity, arrange for economic distribution, and they will be half the price and fifty per cent. more will be required and eaten.

The Germans employ over 600,000 acres in growing *field* vegetables. They also employ more than 7,000,000 acres in producing 45,000,000 tons of potatoes, only a quarter of which are consumed directly by human beings. The balance are largely used to feed pigs, but also partly to produce motor spirit. If the production of spirit from potatoes and from beet was encouraged in this Country, we could save enormous sums we now pay to foreigners and supply ourselves with Petrol.

Potato-drying machines are used in Germany

to prevent waste through rotting in the latter part of the season. The potato industry gives employment to farm workers during the wet season when they would otherwise be out of work.

Potato flour is also a substance which is not as yet understood in this Country, chiefly because its manufacture has never been carried out in a large and systematic manner. Flour produced from potatoes, under scientific conditions and when properly prepared for human food, by mixture with other ingredients, gives an economic change to the household meals.

A ton of potatoes as dug from the ground is largely composed of water. After drying and treating in a mill, the dried flour produced is about 20% of the weight of the original potatoes.

Holland has made great strides in this matter, and the thirty potato flour mills now working there convert nearly 1,000,000 tons of potatoes into flour each year.

Granted that the capitalist has some kind of security, the construction of potato flour mills in this Country would be a good investment and, at the same time, give great additional inducements for home production and save imports of other food.

The fact should be clearly had in mind that the production of one acre of potatoes gives the Nation ten times as much food as is got from an acre of grass land.

The price obtained by English farmers for potatoes on the average of a dozen years before the War was £3 10s. 0d. per ton. An output of 10 tons an acre is obtained when the potatoes are well cultivated and manured, and when a good kind of potato is grown

on suitable soil and from new seed, such a crop is a valuable one for all concerned.

Onions are vegetables that might very well be home-grown to a much larger extent. We import about 10,000,000 bushels, half of which come from Spain, but a large proportion come from Holland, Belgium and Egypt. There is ample room for increase in the field cultivation of these, as well as growing them in the nursery and private garden, and good profits may be made from growing onions as one of the items produced under intensive forms of cultivation.

Carrots, parsnips and artichokes, cabbages, lettuces and sprouts, are all vegetables which could be used to a much larger extent than at present if they were available at lower prices and if housewives chose to practise more tasty methods of cooking them. The French, and all Continental people, make a great deal of variety in their food through the use of much more vegetables each day than we attempt to do.

Ten tons of carrots can be grown on an acre of light soil. Artichokes, which can be grown on any poor soil with very little cultivation, are a much neglected vegetable.

Cabbages would also find a very much increased demand if they were marketed properly. The farmer would willingly sell them at two a penny and, with all reasonable costs and profits added, the town dweller should be able to get them at one penny each.

We actually import 250,000 tons of vegetables each

year, other than potatoes and onions, which could be grown here, while the consumers' demands, if reasonably supplied, would increase a hundredfold.

FRUIT

The value of fruit in the dietary of human beings is gradually becoming recognized, and the knowledge which is being developed regarding Vitamines, which the human being derives, both from fruit and green vegetables, will make their supply all the more important. The price at which fruit could be obtained has hitherto made it more or less of a luxury food. The high cost has arisen from four chief causes :

1. The shortage of supply ;
2. The enormous costs or profits of the middle-man distributor ;
3. The great losses between the producer and consumer, and,
4. The heavy rail and other transport charges.

If large quantities of fruit were forthcoming and were supplied to the wage-earner at low prices, an enormous market would be created and the costs and losses of distribution would fall rapidly. The difficulty, of course, is to bridge the intermediate time between the present small, wasteful supplies and the attainment of the ideal, when every household, at a few pence a day, would get fresh summer fruit in their season, or properly stored apples and pears and preserved fruit in the winter.

The time will come when all apple trees and pear trees in our orchards will be of really good sorts. The old orchards supplying apples which do not attract, will give place to the kinds of apple for which to-day we have to pay double price.

Developments in storing on a large scale are already overdue. Possibly storing methods will develop along the lines of keeping apples and pears in a neutral atmosphere in which, until they are wanted for the table, their ripening cannot proceed towards decay.

The wage-earner's children and, indeed, the grown-up members of the family, would rejoice if jam could be supplied at a price making it available at least once a day, but while we are importing £1,000,000 worth of jam a year and are producing no sugar, it is not likely that jam can be produced at a figure which will make it an everyday household food in large quantities.

Increased production and much improved organization, are all that are needed to build up an enormous home fruit industry and the small holder, the market gardener and the cottage gardener can all participate in this development of agricultural industry, so soon as home production of all descriptions of soil products becomes a definite part of the Country's economic policy.

The practical questions arising out of fruit-growing, especially in regard to apples, are largely connected with the killing of pests. The spraying, which for many years has been looked upon as often more important than manuring, in apple production in foreign

countries, is not yet fully appreciated in this country. In America 25% of the cost of growing apples is probably the cost of spraying the trees four or five times before the fruit is formed, but it assures a good crop.

Packing is also a question to which a great deal of thought and attention has been given abroad. Grading, i.e., selecting for different markets, is also a matter of very great importance and one which pays for a thorough study.

Fruit growing is an industry which, with very few exceptions, is better practised in conjunction with other forms of Agriculture. Work in orchards and fruit gardens is intermittent, and there is usually a good deal of spare time which can be devoted, with advantage, to other field crops, to vegetable growing, pig feeding and dairying.

The selling of the fruit crop is usually the difficulty, not because there is not an ultimate demand, but through the want of organization, for packing, carrying and marketing, in a businesslike manner. The temperament of the man who grows fruit is not usually that most suitable to commercial work of finding markets and, at present, in this country there is a great lack of broad-mindedness and brain power in the fruit-distributing trade.

Co-operation and agency selling, in free markets by men who wish to create increased trade—and not merely to make the highest profit on the commodities sold each day—are badly wanted to develop the fruit and vegetable industry.

The marketing of fruit, vegetables, eggs, poultry,

butter, cheese and numerous other products of the gardener, the small holder and the smaller farmer, needs a considerable amount of organization under the advice and assistance of some central Authority and of a Board in each district.

A free market should be established in every centre of population that exceeds 10,000 or 15,000 inhabitants, in which the market stalls should not be held by shopkeepers, who are there to make as much profit for themselves as possible, but at which the products of the producer should be sold on commission by practised salesmen, who would, from the fact that they were in competition with each other, secure that the consumer was not overcharged, and yet would be able to pass on to the producer the full market value of his goods, less the actual cost of selling.

In some districts the Committee of Management might prefer that the salesmen should be the servants of the Market Committee and be paid a wage, the Farmer being charged a toll by the Market Officials.

At the end of each day an auction would take place of any perishable goods left over.

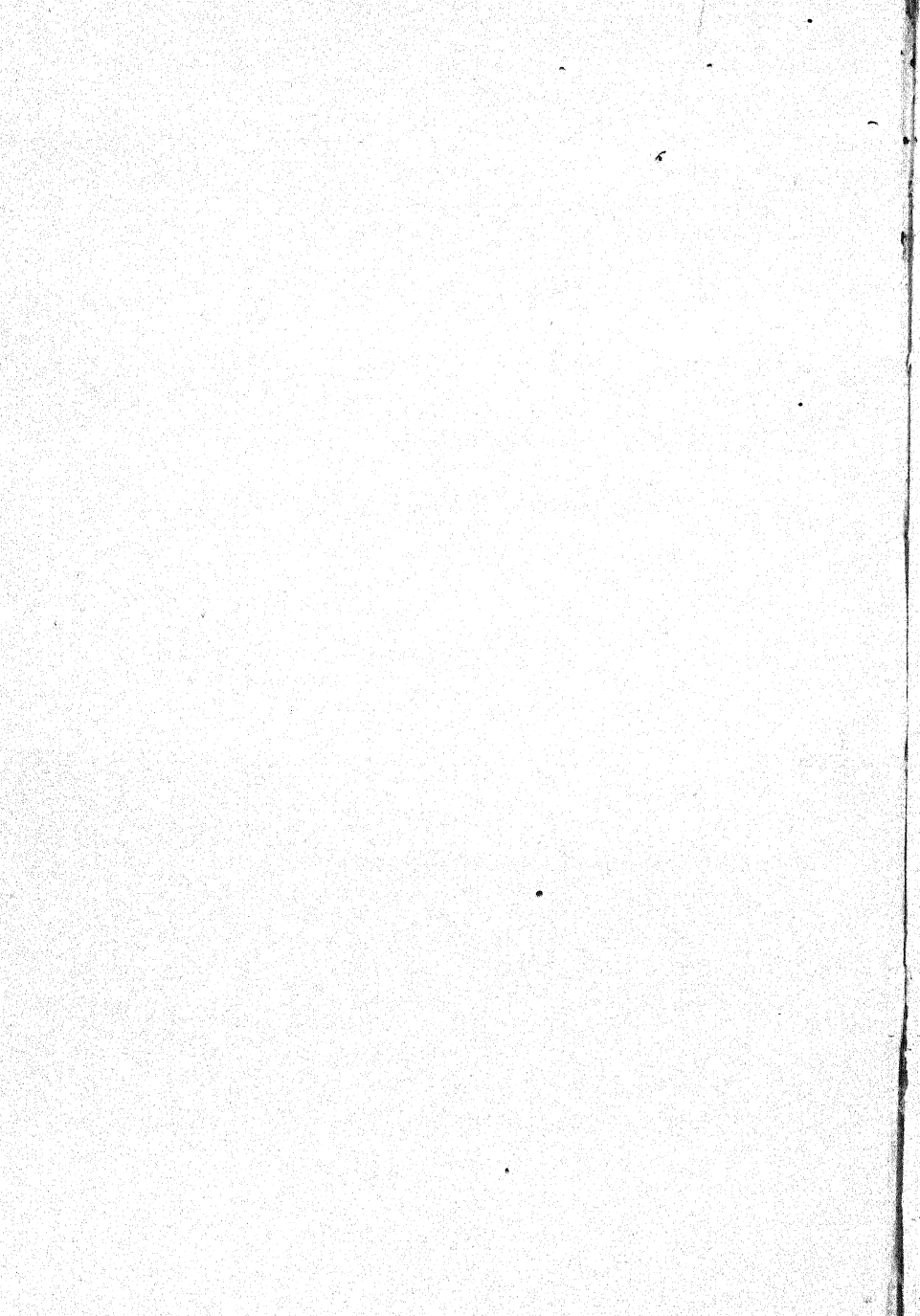
Germany has learnt the lesson of fruit and green vegetable growing. The orchards alone in Germany increased 150% in the thirty years before the War.

In Germany the estimated production and consumption of green vegetables, excluding potatoes, is put at nearly 200 lb. per head of population each year.

The fruit production of Germany is also an object lesson to us. They have 90,000,000 apple and pear

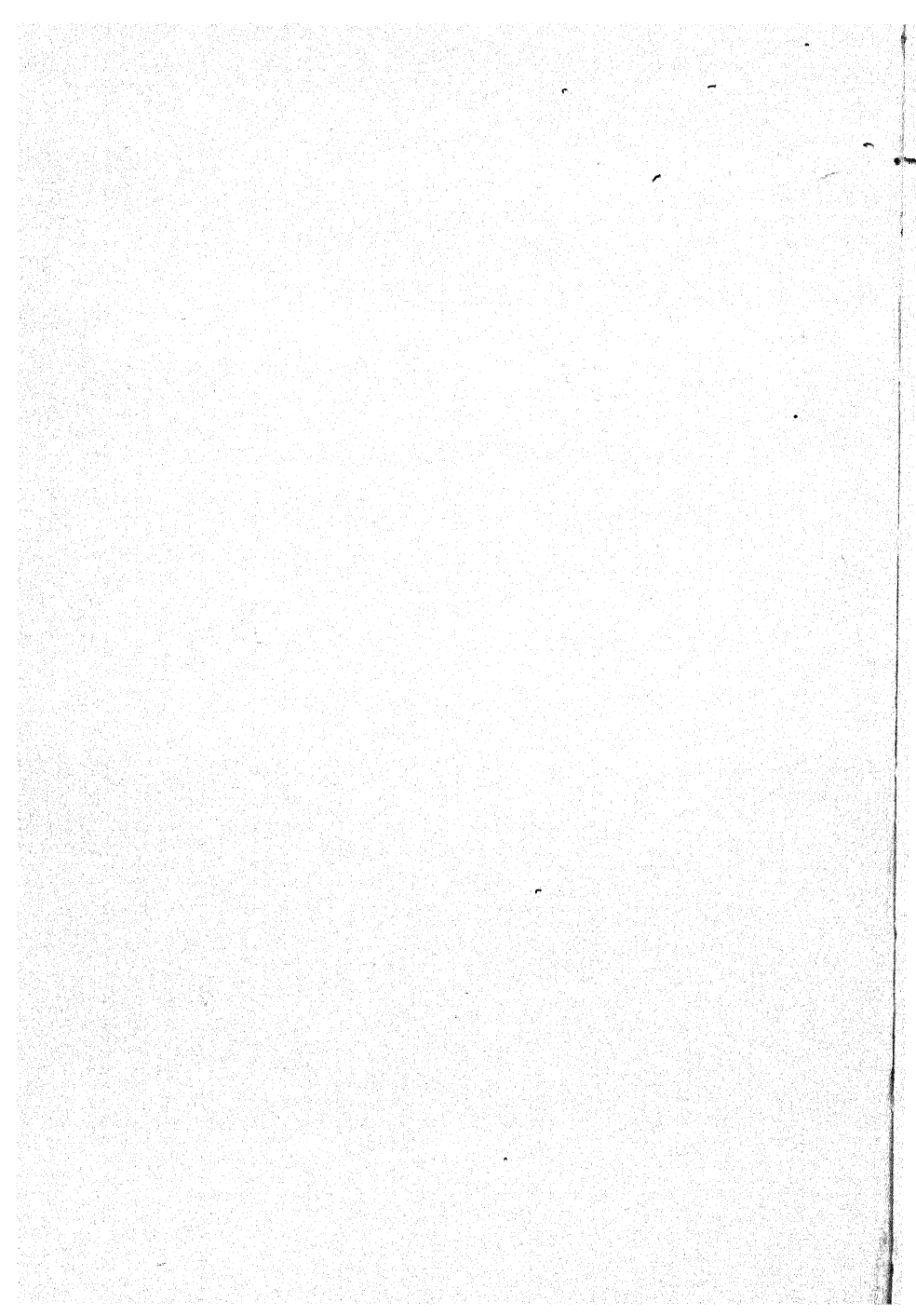
trees, giving on the average 30 lb. of fruit per tree, while 80,000,000 plum trees are cultivated.

On the average each head of the population consumes 100 lb. of fruit a year, of which less than one tenth is imported, as oranges or tropical fruit.



CHAPTER XII

SMALL HOLDINGS—POULTRY, EGGS AND GOATS



FARMERS occupying small farms, also those who are now so frequently spoken of as Small Holders, and those occupying gardens for profit, will find amongst the items on the following list of Imports, many articles of food which can be grown profitably in this Country. A large number of them can most economically be produced on small areas. Some local circumstances may occasionally make it worth while to grow cereals and a few cattle or sheep on small farms, but in the £120,000,000 worth of Imports in the next Table, these are not included. A later Chapter about pigs and bacon should also be very carefully read.

Those who, for reasons of capital, individual taste, social position, or personal idiosyncrasies, find it desirable to work single-handed in outdoor pursuits rather than to take wages, will naturally be attracted towards Poultry Keeping, but most of them will find it advantageous, from a commercial point of view and also that of personal interest, to devote part of their time also to fruit and vegetable growing. The last Chapter will have shown the ample opportunities

TABLE XIX

LIST OF IMPORTS WHICH CAN BE PRODUCED IN THE UNITED KINGDOM ON THE SMALLER FARMS, SMALL HOLDINGS, AND MARKET GARDENS

Description.	Imports of a normal pre-war year.	
	£	Total £
Pork	1,665,495	
Bacon and hams.....	20,497,132	
		22,162,627
Eggs	9,590,602	
Poultry.....	992,463	
		10,583,065
Rabbits	781,376	
Rabbit skins	817,604	
		1,598,980
Butter	24,083,658	
Cheese	7,035,039	
Lard	6,017,965	
		37,136,662
Tomatoes	1,348,682	
Onions	1,035,000	
Potatoes.....	2,589,038	
Vegetables (various).....	519,340	
		5,492,060
Flowers, fresh		288,728
Apples	2,230,370	
Cherries	123,230	
Currants.....	147,407	
Grapes	740,543	
Nuts	893,867	
Pears	650,084	
Plums	437,306	
		5,222,807
Jam and preserved fruit ..		1,203,000
Sugar (beets)		23,072,000
Total.....		106,759,929

for developing vegetable and fruit production in England, the marketing of which also go well with the selling of poultry and eggs.

* * * * *

POULTRY KEEPING

Poultry Keeping may well be considered from three different points of view, viz. :

1. The man who has considerable capital and wants to develop Poultry Keeping on the scale of keeping a stock of 2,000 hens or more, which involves the hiring of labour and the occupation of a considerable area of ground.

2. From the point of view of the person who, with a small capital, is yet going to work really hard all the time at producing something.

3. The third kind of Poultry Keeping which is profitable is that carried out by the cottager, who, having a piece of garden to spare, is willing to devote certain half-hours to feeding and looking after a dozen or two laying hens or ducks.

To the last of these classes of Poultry Keepers the products of the fowls are almost entirely profit, because in every household with a piece of garden, there is some waste food, potato peelings and waste garden produce generally, which, if properly saved for their food, will go a long way towards keeping a few hens. The cost of the few handfuls of grain

needed in addition is more than met by the value of a quarter of the eggs produced.

The Poultry Farmer who carries on a medium-sized enterprise, must work things out on more scientific lines. In the first place, he must get a piece of soil that is not too wet and heavy. He must have sufficiently large runs for exercise, and change over. He must settle beforehand whether he proposes to devote himself chiefly to egg production, or to growing fowls for the table. He must then select the kinds of hens that are most suitable to egg production, or to building a body suitable for the table, and then he must consider how to market his products.

What we may call the Capitalist Poultry Farmer has to consider the above problems, and also, as he is a large purchaser of food, he will be wise to make a careful study of the kinds of food that give him the best results, and what classes of food are in the markets that will work out at the lowest price per unit for the different foods he could use.

As a Poultry Farmer on a large scale will have to employ labour, he will probably go in for table fowls, as well as egg production, and, if he follows the lead of the United States, he will also develop a trade in selling "Broilers," i.e., chickens of six weeks old. Also he may have over his hen houses cotes for pigeons, so that he may market large quantities of young, hardly-fledged "Squab" pigeons, which are profitable, and are a usual breakfast dish in the States.

Poultry Keeping is already making some little

advance in England, and, from one country station in Sussex, 1,500 tons a year of dead poultry are sent to the London market.

Before the War, however, we were importing over £1,000,000 worth of dead poultry a year.

Our import of eggs was, in value, close upon £9,000,000.

The last Census of Production figures show that only about £5,000,000 worth of eggs were being produced at home.

There is, therefore, ample room for home growing of Poultry, and especially eggs, and we ought to have the £10,000,000 profit from Poultry, and not foreigners.

The number of eggs imported, if laid by hens in this country, would require the keeping of an additional stock of about 12,000,000 hens. After deducting the value of the chickens they would bring up, there would, at pre-war import prices, still be left a gross income of £1 per hen, from the eggs we could produce at home if we ceased importing.

The cost of growing eggs is not an easy figure to ascertain with exactness, as few people keep accounts which can be relied upon, but one of the Agricultural Universities has done so, and their figures indicate that, at prices of food current during the years 1919 to 1921, the cost of feeding a hen for a year is about 15s. Since then grain has fallen considerably, and the cost per hen, with grain and other food at near pre-war prices, is well under 10s. each. As just shown, the pre-war import value of stale eggs comes

out at over £1 per hen. Thus, without counting the extra profit from the fresh egg trade, it would seem that 10s. a hen could be safely calculated on as a profit when growing eggs on a very large scale for purposes now supplied by imported stale eggs.

On the other hand, in the fresh egg trade, as ascertained by the above Agricultural College, results showed that there was a surplus over the food cost of something like 30s. per hen, out of which would have to come the rent and labour.

How far people will put up with stale eggs if they can get fresh ones is a question which the taste of the individual and pressure on the pastry-cook will eventually decide. As half our imported eggs have the long journey from Russia, and 131,000,000 of them come from Egypt, staleness does not seem at present to be an absolute bar to consumption. We get about one quarter of the eggs we import from Denmark, and those being produced near at hand, are comparatively fresh, but why should not we produce them at home?

In the United States, egg producing has been an enormous business, and more than £100,000,000 at the farm, is now obtained from the "Busy American Hens."

* * * * *

GOATS

Goats are not much thought of in times of prosperity because of their individual small unit of production and the consequent labour connected with milking them. As the competition of other countries in our markets for export manufactured goods gradually makes the value of each shilling more felt through all classes of people, the value of the goat will probably be realized. Goats are essential means of saving the shillings in the cost of living and not the pounds. The keeping of goats should, therefore, be undertaken by the country cottager, or small holder, to whom every shilling a week of expenditure on food is of importance. The time occupied in tethering a goat on a piece of waste ground on the road side, in milking the said goat, etc., is so much saved from time which would probably not otherwise be used to any great practical advantage.

One or two goats are especially valuable to the country cottager who lives some distance from the supply of cows' milk.

There are good goats and bad goats, but if the breed of goats is gradually improved, the average milk of a fairly good one ought to be between 70 and 100 gallons a year. Some very good pedigree goats are said to give 200 gallons a year.

In regard to goats, as in regard to so many other agricultural subjects, we have a lot to learn from the thrifty Germans, who produce £10,000,000 worth of

milk from their goats each year. Germany had 3,500,000 goats in 1913, but during the War increased this number, and in 1918 had over 5,000,000. India keeps 33,000,000 goats, and makes millions out of their milk and skins.

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SMALL HOLDERS

What is written above in regard to fruit and vegetables, poultry and goats, and what will be found in Chapter XIV. in regard to pigs and their products, are essentially matters which should be of greatest interest to Small Holders in general.

One of the best authorities on the subject of Small Holdings has estimated that we import £46,000,000 worth of products, the growing of which ought all to be obtained from Small Holdings, and this sum is without reckoning pork and bacon.

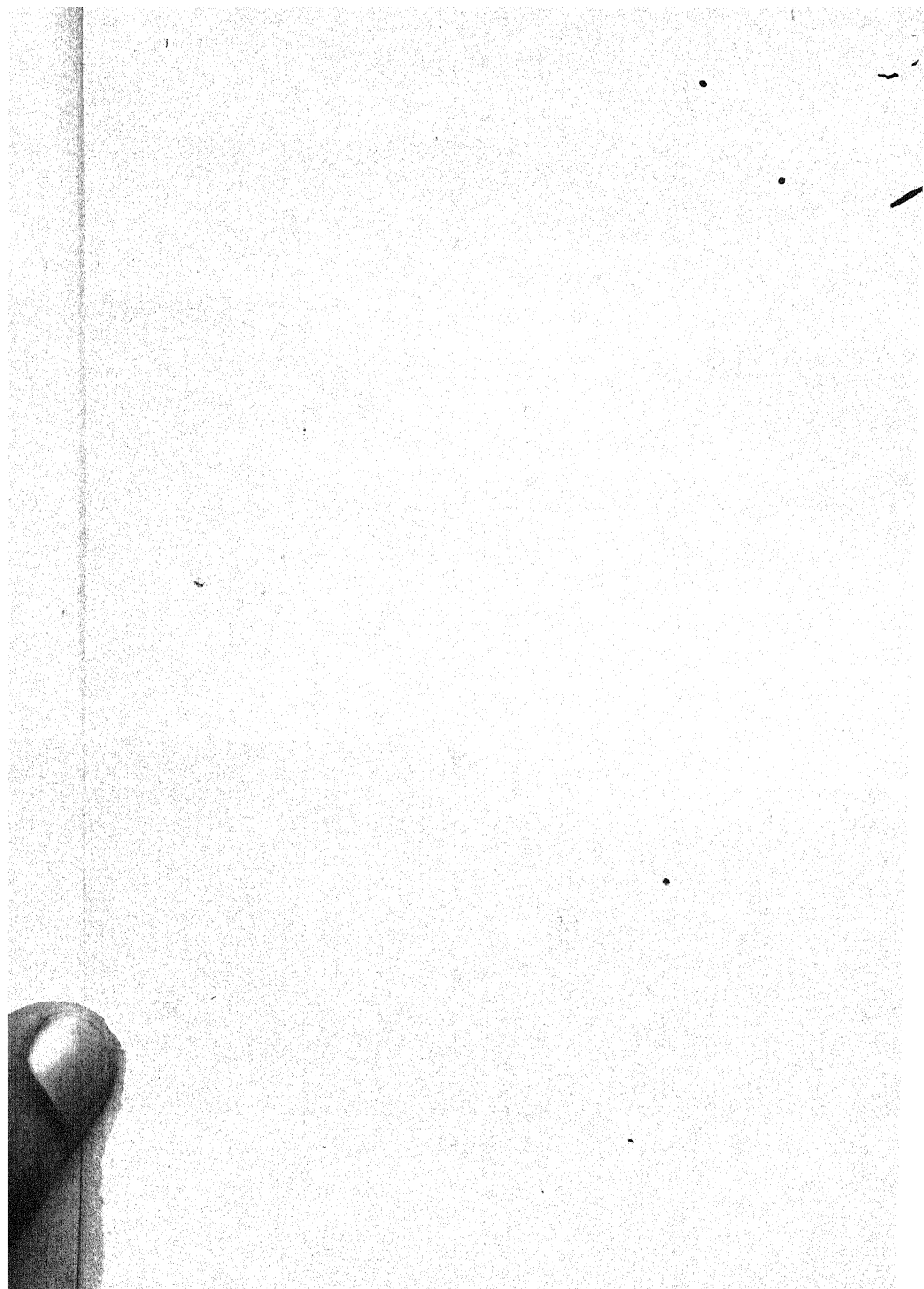
Naturally the Small Holder must occupy a house and buildings, the rent of which are commensurate with what he can produce from his holding. If a man has 5 acres, out of which he has, by his own labour, to produce a living for himself, wife and two or three children, he cannot make enough to pay £100 a year rent for his house, or even half that sum. The Small Holder must have a knowledge of his trade. He must work with his hands, and with his head, and, provided he is a suitable man and has suitable land, he will then make a living, but without experience or application, the novice probably—the loafer certainly—is doomed to disaster.

Free Markets ought to be established in every centre of population in which eggs and Poultry can be supplied from the producer to the consumer on the lines suggested at the end of the Chapter on "Fruit and Vegetables."



CHAPTER XIII

HOME SUGAR PRODUCTION, FLAX, HOPS AND TIMBER



IN everyday life, during the War, the shortage of Sugar was more felt by the housewife, and the people in general, than was the scarcity of any other commodity. On the other hand, no other article of great cost to the Nation and on which we depend so much, can be more easily produced at home than Sugar. Every other country of Europe, including Sweden and Spain, produce their own supplies of Sugar. Holland, Germany, Belgium, Hungary and other countries have got enormously rich through its export. In England alone we practically produce none.

In every County of England south of Yorkshire, Sugar Beet has been grown successfully, not only as to the quality of the Sugar Beet produced, but as to the quantity per acre produced, and the cost and method of growing it.

Before the War there was an obvious conspiracy of Continental Sugar interests, which seemed to have captured the intelligence of those in power in this Country and prevented us from developing home Sugar production.

In the early part of the War, at the request of the Minister of Agriculture, a scheme was worked out, under which 90 local factories would have been erected, and the most suitable situations for each of

these were mapped out, not nearer than 10 miles apart. They were, as far as possible, to be at railway junctions. The output of these factories, which would have been constructed on the most modern Continental methods, would have given us, all through the last years of the War and ever since, the Sugar we need. The factories, if erected at that time under Government guarantee, would have cost £12,000,000, but when it is pointed out what the yearly imports of Sugar have cost the Country ever since, it will be seen that, had the Government carried out the scheme and spent the £12,000,000, once for all, the saving each and every year since is more than the first cost of the factories.

The cost of Sugar imported for Home Consumption in the following years was :

	£
1913.....	23,066,621
1917.....	36,709,596
1918.....	34,411,277
1919.....	53,962,429
1920.....	73,140,456
1921.....	35,283,957
1922.....	33,564,921

The proposal made to the Government was that farmers in the neighbourhood of these factories should be required to grow Sugar Beet on not exceeding 5% of their plough land, and that they should have been compensated by being paid the entire cost of producing the Sugar Beet plus a reasonable profit.

A scheme of this kind—or some modification of it—might very well be sanctioned by the present

Government as one of the steps towards the development of British Agriculture and the saving of the enormous expense of importing Sugar. The whole of the cost of producing and the profit would be kept at home, and Sugar, if allowed to be produced without being subject to Excise Duty, could again be sold to the public at the average price which existed before the War of about $2\frac{1}{2}$ d. a lb. The Nation would lose nothing by its guarantee to the farmer, as a properly-run factory should supply Sugar *at this price* and yet pay the farmer a profit on producing the Beet.

The adoption of the Sugar Beet industry in Germany, thirty-five to forty years ago, was the real commencement of general agricultural development in that Country. The good cultivation employed, and the use of large quantities of fertilizers, needed for producing Sugar Beet, got the soil into such good heart and condition that the Cereal crops succeeding the Sugar Beet were found to be much better than in neighbouring fields. Now there are more than 350 Sugar Beet Factories in Germany, and as Sugar Beet growing developed on a larger scale, so the general trend of Agriculture there improved all round.

Sugar growing in this Country would have the same beneficial effect towards increasing our general output of other crops and assist towards an atmosphere of more intensive general farm cultivation.

From the above Table of Sugar imports it will be seen that, from the Foreign Exchange and Foreign Trade point of view, Sugar is of great importance to us nationally, and, when looking at the figures

for the year 1913 it is found that 95% of the Sugar we imported came from Foreign Countries and only 4% from British Possessions, it will be realized that, by growing our own Sugar, we are not likely to hurt our Colonies. In fact, as a certain amount of Cane Sugar will always be required in this Country in any case, there is every opportunity for Britain-beyond-the-Sea to increase its output of Cane Sugar and ship more of it to us.

The dwellers in our towns should, therefore, realize that any help given to English-grown Sugar will give a great additional spending power to our own people, although such a policy may not be pleasing to Germany, Cuba, Hungary, the Netherlands and Belgium, whom we have been enriching at the expense of our own farm and factory workers.

Sugar, of course, is a food for humans and for most animals. It is a pity we cannot live entirely on Sugar because 1 acre devoted to growing Sugar Beet produces as much human food as 20 acres of grass land. If we could live entirely upon Sugar and were to cultivate only one-sixth of the land we have under plough crops and grass and use it for Sugar Beet growing, we should, on those about 8,000,000 acres produce all the food the whole Country consumes.

This is rather a startling fact, but we cannot make direct use of it, at any rate unless and until a Committee of Chemists, Biologists and Dietetic experts find a way of converting it into an all-round food for human beings, or re-organizing the digestive organs of the humans to consume it as a sole food.

Nevertheless, the fact that from one-sixth of our

area we can produce equal to all our own food when intensively cultivated and growing one kind of crop, is surely a strong argument in favour of attempting such increase in intensive production as to provide the kinds of food our digestions are able to assimilate, to the full food requirements of the population.

The ground that would be used in producing our own normal Sugar imports would be somewhat above 1,000,000 acres a year and the soil generally used for producing mangolds or turnips, potatoes, clover and other forage crops grown on ploughed land, would come in most usefully for this purpose. The land employed for these forage crops in 1913 was 10,300,000 acres. It would not be a big thing to take away 10% of this area and devote it to Sugar growing and yet get the same result from the remaining 9,000,000 acres by intensifying its output by increasing its fertility 10%.

As explained in the Chapter devoted to the Employment of Labour, Home Sugar production and refining are ideal methods of employing large numbers of unskilled workers all the year round.

FLAX. A few words may be devoted to this item of our Imports. When things were normal, we imported £5,000,000 worth of Flax, representing about 100,000 tons. There are many districts in the United Kingdom where this Flax could be produced with many advantages to the local population and to the net saving to the Country of nearly the whole of the sum paid away entirely to Countries outside the British Empire.

JUTE. Our climate prevents the economic growing of Jute, but the world's consumption is entirely produced in our Indian Empire, from which this Country alone imports about £10,000,000 worth, largely for the making of sacks.

HEMP. We import £4,000,000 worth in normal times, but, again, our climatic conditions are not so suitable as those of the Philippines and other regions where it is grown, and the growing of this material is not an industry, the development of which should be pushed in the British Isles.

HOPS, on the other hand, grow well and of the very best quality in the South of England, yet in each of the years 1912 and 1913 before the War, we imported £1,700,000 worth of dried Hop flowers, chiefly from America, Germany and Belgium. This represents about 12,000 to 13,000 tons a year.

For 1920, the returns show the value of imported hops to be more than £8,800,000 for 23,000 tons.

The Kentish Hop grower has now learned how to make practically sure of a fair crop even in a year of bad pests, and if he was certain he would not be swamped by the dumping of an occasional surplus of a bumper crop from the States, he would when beer gets nearer its normal price again replant the 20,000 acres of Hops grubbed up in the War years and thus help to secure the working man a glass of good sound beer.

TIMBER

Timber, its production and use, is a very big question and cannot be treated of in detail in this small Volume, but, in passing, it may be pointed out that we imported, in 1913, the following Timber we could have got from our own woodlands ; had forethought, care, energetic management, proper extensive planting, thinning and good organization, and the expenditure of capital been devoted to them in the past.

The Imports were :

	£
Fir timber	21,500,000
Oak „	1,750,000
Pit props	4,500,000
Staves	1,000,000
	<hr/>
	£28,750,000
	<hr/>

The above list does not include special hard woods, Teak, Mahogany, etc., and the woods imported for furniture, wooden ware, joinery, and the like.

All the Pit Props and Oak Timber and Staves needed in this Country for many years to come can be obtained from existing Woodlands, and a good deal of the Fir, Spruce, Deal timber can also be supplied from plantations already growing, especially in Scotland, where forestry has, for years past, been far in advance of most English practice.

The Nation ought, for the sake of posterity, if not for our generation, to take vigorous steps to plant up our present neglected Woodlands and take into Timber cultivation an acreage of over 1,000,000

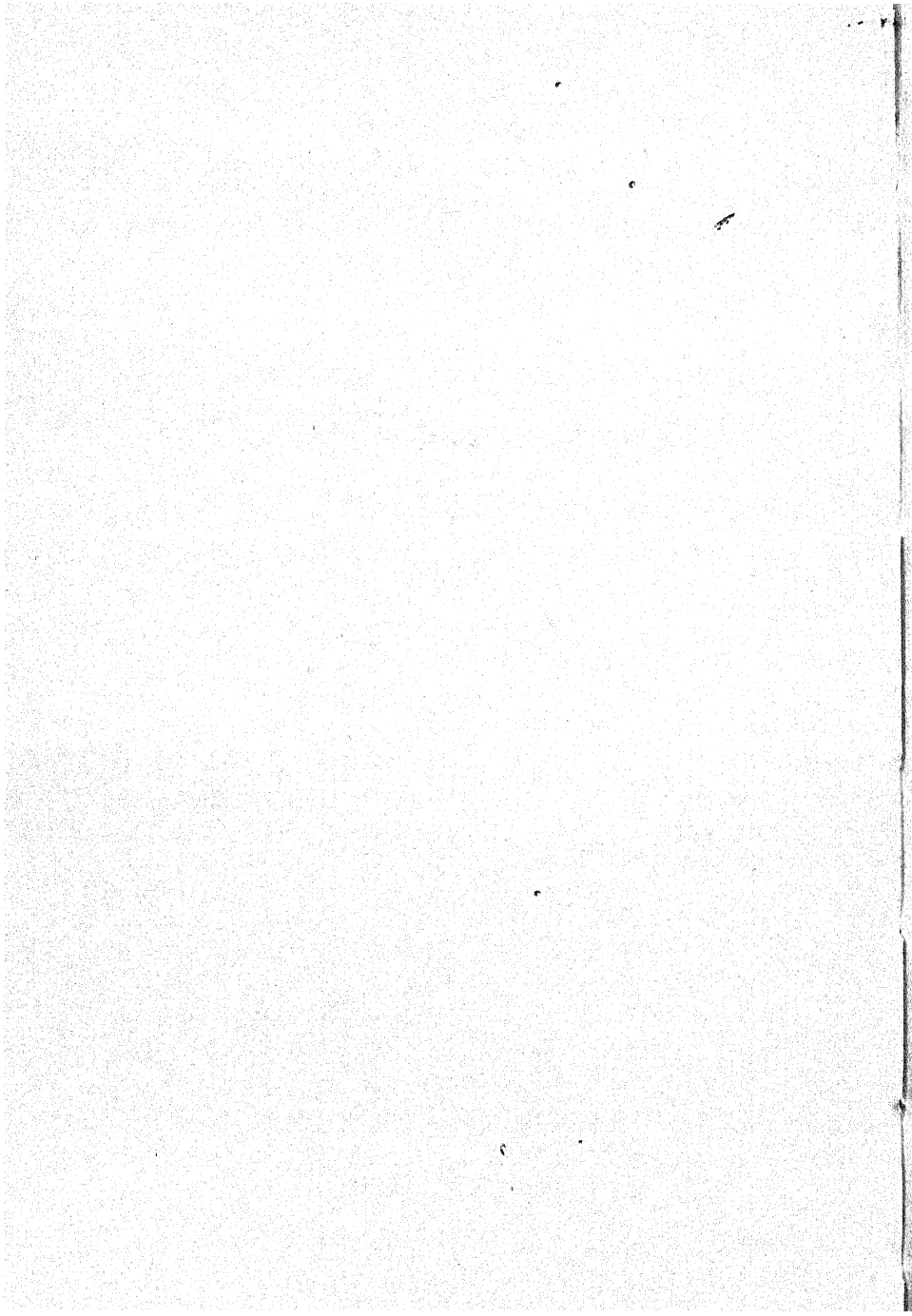
acres of Mountain and Heath land that is eminently suited for growing fir trees.

Landowners have not the capital for planting woods which will not bring in anything for thirty or forty years. The Nation would ultimately benefit and had much better pay out money now to men for planting work than giving unproductive doles which only serve to weaken the moral of the Unemployed.

In November, 1922, out of a vote of £50,000,000 to be paid by the Government to Unemployed in the coming winter, the generous sum of £100,000 was to be used for Forestry and Tree planting. This in comparison with £28,000,000 a year paid for Foreign Timber shows about the same proportion of consideration as has been given by Politicians in the past to the subject of Home Soil production in general.

CHAPTER XIV

FIGS, PORK AND BACON



DO not turn away from this Chapter and say that the subject does not interest you. The cultivation of pigs is of very vital interest to everybody in the Kingdom, whether they are aware of it or not.

We will first consider the question from the political aspect, for the production of large quantities of pork and bacon have, as will easily be seen, a strong bearing upon the Nation's future Policy. It is equally of importance to those who have to consider questions of Foreign Exchange.

Before the War, we sent abroad yearly £25,000,000 to purchase pig meat and in later years—in 1921 for instance—we had to provide £55,000,000 in Foreign Exchange for pork, bacon and hams we bought abroad.

That these large supplies are needed by the community is a fact that we cannot afford to neglect. For the actual manual worker of the Country, pork and bacon were formerly the cheapest and best way of supplying that kind of food which gives strength for continuous physical labour. For producing the energy needed for labour, fat bacon is twice as valuable a food as beef. For this purpose it has three times the value of white bread.

These facts, when considered in conjunction with the economic truth that pig meat can be produced at

a very much lower rate of cost, should help to weigh down the scale in favour of pig cultivation.

The low cost of producing pork and bacon is attributable to four facts :

First, the pig is so constructed that it will manufacture 1 lb. of pork out of $4\frac{1}{2}$ lb. of concentrated food. A sheep, on the other hand, requires 9 lb. of food to make 1 lb. of mutton, while a bullock has eaten 14 or 15 lb. of food of the same value for 1 lb. of beef which the butcher has to sell on the slaughter of the animal.

Secondly, within twelve months a sow brings up 16 to 20 pigs. A sheep and a cow, on the average, only bring up one lamb or one calf each year.

Thirdly, a young pig, if very well fed, is fit to be killed for pork in less than six months after it is weaned, and weighs, at that stage, 200 lb. If a pig is kept till nearly a year old, and fed steadily the whole time, it can be sold as a fat or bacon pig and weighs 350 lb. On the other hand, an average sheep at eighteen months old does not weigh more than 200 lb., while it takes nearly three years to grow a big beef ox.

The fourth attribute of the pig is that about 80% of the live weight of a pig is used as human food. Only about 60% of a bullock, or an ox, or a sheep, can be sold as meat. The bullock and the sheep, owing to the fact that they have to walk so much after their food, and are so much older when they are fit to kill, have, in their physical development, more bone, a stronger frame and head and more waste tissue, in proportion to their meat than is necessary for the modern shaped and home-fed pig. The

shape of a modern pig is more economic than were those bred fifty years ago. By selection of parent animals, a breed of pigs with very long bodies, small heads and the minimum amount of bones, has gradually been obtained and with the most economic results.

All animals require a supply of food each day in order to maintain the heat of the body and keep it in good health. The quantity of this food, which is called the Maintenance Ration, is in relation to the then weight of the animal. In addition, animals require a further quantity of food in order that they may continue to add to their bulk and to their weight of meat and fat.

Now a pig puts on flesh and fat so rapidly that the Maintenance Ration is required for a comparatively short number of months. If an ox, when killed at three years old, weighs 1,200 lb. it had to consume the Maintenance Ration for more than two years for the 400 lb. it weighed at one year old, and for more than one year on the weight it put on during its second year's life. This is, to a great extent, the cause of the large amount of food the ox needs to produce 1 lb. of beef.

Bacon has for generations been the staple food of the breakfast of all Englishmen, who could afford it. Fat pork was for years almost the only meat food consumed by the agricultural labourer and by many of the town workers. Pork, when we grow it at home in large additional quantities, will be the cheapest form of meat and will, therefore, be consumed by the manual worker and his family. These are such a

vast majority of the population that the taste of the few epicures does not have much weight in this argument. It has been said that the pig is not the rich man's fancy, but it certainly is the poor man's friend.

The pig is equally suitable in every kind of farming. The large farmer, who does not make a speciality of growing pigs, still finds he must have some always about his farmyard to eat up waste corn products and small potatoes.

The man who farms a medium-sized farm, finds the profits from twenty to thirty pigs a very valuable adjunct to his general farming profits, while to a Small Holder he is indeed a blessing.

With a "self-feeder" pigs require very little looking after, and can be kept on a comparatively small space. Pigs come quickly into a saleable form and the capital locked up in the breeding stock is very small.

The pig or two kept by the Cottager not only pays his rent, but, when properly looked after, also goes a long way, together with bread and home-grown potatoes, towards feeding the entire family.

There are plenty of reasons for greatly increasing our pig keeping. The import into this Country of bacon, pork and hams was very large before the War, but in the total cost of imports it has, of course, increased enormously of late years. The figures are :

IMPORTS OF ALL PIG MEAT.

	£
1900	17,000,000
1910	17,500,000
1913	22,000,000
1921	55,000,000

The quantity of pig meat imported in the past considerably exceeded the quantity of beef or mutton we buy from abroad. In fact, in some years, it was practically equal in value to the total imports of beef and mutton together.

A study of the following Table of the amount paid for bacon alone should give thought to those Statesmen who consider the future of this Country :

IMPORTS OF BACON ONLY.

	£
1913	17,000,000
1914	18,000,000
1915	25,000,000
1916	34,000,000
1917	41,000,000
1918	90,000,000
1919	73,000,000
1920	50,000,000
1921	43,000,000

Before the War £10,000,000 worth a year came from Denmark. During the War, the bulk of bacon came from the United States.

Statesmen should also use the following Table in forecasting from the past what may happen in the future :

STOCK OF PIGS.

	1908.	1913.	1919.	1921.
United Kingdom	4,000,000	3,300,000	3,000,000	3,600,000
Germany	16,000,000	26,000,000	11,000,000	16,000,000
Denmark	1,400,000	2,500,000	600,000	1,500,000
United States ..	54,000,000	61,000,000	74,000,000	56,000,000

The suggestion, made by the Royal Commission on the Supply of Food in the time of war, in 1905, to build enormous granaries for the storing of wheat in

this Country was a good one, as far as it went, but the Commission did not deal with the provision of fat, which is equally necessary for the maintenance of human life. The Germans were more foresighted than ourselves because, in the years preceding the War, they had doubled their number of pigs and thus ensured the large stock of fat which enabled them to continue the War for four years.

Denmark, which only kept 500,000 pigs twenty-five years ago, had—although a very small country—nearly reached the stock of pigs kept in England by 1913 and must have derived huge profits from selling these during the War.

Pigs multiply so quickly that the United States was able, at the beginning of the War, to increase her breeding stock very largely and it is owing to the fact that the States were able to export to us her large surplus, that we were provided with our bacon rations, which, although not always palatable, kept us well above starvation point in 1917, 1918 and 1919.

There is no better precaution which can be taken against Submarines than a very large increase of our stocks of pigs, and it could not be considered a dole, or a subsidy, for the benefit of Agriculture, if the Government gave some sort of a premium to ensure an increase of the stocks of pigs for purposes of National safety.

They can be increased very rapidly, as 100 breeding stock produce for sale 1,123 animals a year. A similar stock of sheep produce only 102, and the same breeding stock of cattle produce only 86 net for sale.

In regard to prices, those of the period before the

War must be considered rather than the violently fluctuating figures caused by the War. It is not to be expected that prices as low as those of pre-war days will prevail in the immediate future, but as no positive forecast can be given, every man must judge for himself as to what price to expect above the previous normal rates.

AVERAGE PRICE PER POUND OF ENGLISH WHOLESALE DEAD MEAT FOR TEN YEARS PREVIOUS TO THE WAR.

	d.
English beef	5 $\frac{3}{4}$
„ mutton	7 $\frac{1}{2}$
„ pork.....	7
„ and Irish green bacon	7 $\frac{1}{2}$
Smoked hams	10 $\frac{1}{2}$

The prices have been rising very slightly all through these ten years.

This Table gives an idea of what it must have cost to produce under pre-war methods, and at the pre-war prices of pig food. The price presumably included some profit to the Farmer, or he would not otherwise have continued to keep pigs, but the profit evidently was very small, as the total number kept did not increase.

In the last few years, considerable improvements have been developed in the breeding of pigs. This is chiefly due to the thought and enterprise of the Danes, who, realizing that the front portion of the pig was not of such value per pound as the middle and the rest of the carcass, sent their experts to this and other Countries, and bought up thousands of boars with small heads and jowls. More recently, our bacon

factories, having also learnt the lesson, are supplying boars of a very economical shape to those farmers who will supply pigs to our few English bacon factories.

Further, economy in the rations given to pigs, and improvement of breed, have been brought about through scientific investigation and the individual enterprise of people who, having money from other sources, have devoted part of their energies to pedigree pig breeding and keeping.

A more rational method of keeping the sows and young pigs by giving them freedom in fields or woods, is also favourably affecting the stamina of some of the breeds, even though the sows and young pigs do not derive much of their food from the ground over which they are allowed to roam. Their food has chiefly to be given to them artificially as in the case of other pigs.

The latest improvement, which will probably have a considerable effect upon the decreased cost and increased number of pigs, is the introduction of "Automatic Feeders."

It is quite likely that, in the near future, costs of producing will be lowered by such organization as the following :

Large farmers will devote 50 acres of ground for pig rearing and fattening, with perhaps several hundred acres of other ground for producing the bulk of the food for such pigs.

The fifty acres of home ground would be divided up into a hundred long yards or pens of half an acre each. Thirty of these pens would be used by the sows and their litters. The rest would be occupied

every six months by a new lot of four young pigs per pen, which could be kept there till ready to kill.

Between the ends of two lines of pens, a road would be made, and inside each pen, near the road, an automatic feeder would be put under a light, cheap roof, which roof would be extended over a small shelter for the pigs, to keep them from the sun in summer and the wet and cold in winter. On one certain day in each week a cart would come along and tip a bag of mixed meal into the automatic feeder of each pen, and this would supply the food of the four pigs for the next week. A 200 lb. bag of food would be the weight required for each pen at the average age. The farmer would give them a general superintendence, and one man on the spot would be required to look after the sorting and health of the pigs, and to see that their automatically supplied water troughs were full.

Formerly no one thought of giving pigs dry food. The meal, or offals, given to them was always mixed with water and had to be carried round. It was the Americans who first found that pigs put on weight more rapidly when given their corn dry rather than in the form of crushed or wet maize. English pig keepers are now adopting dry automatic feeders for meal, corn and offals. The pig drinks at will from a water trough kept well supplied.

The farmer we are treating of above, should by this method, have 250 cheaply produced pigs of eight or nine months old, on the average, to sell to the butcher, or bacon factory, twice every year.

On any such large system as this, the cost, other than the food, would obviously be very small and

several such farms in a neighbourhood with a central bacon factory could, even with the market price of cereals at 40s. a quarter, produce pork and bacon at prices not very much, if at all, above those of pre-war days.

In regard to bacon factories, these are at present very few and far between. Private enterprise would supply the capital for the erection of much needed additional factories, if there was security, but the security can only be given through the weight of National opinion forcing the Government to adopt a policy of supporting home food production. It may be necessary at first for the Government to guarantee Bacon Factory Debenture Bonds to secure capital.

These bacon factories—like the sugar factories dealt with in a previous Chapter—are essential to producing low-priced British food, and it is the town dweller's duty, and very much to his own interests, to see that their establishment is secured.

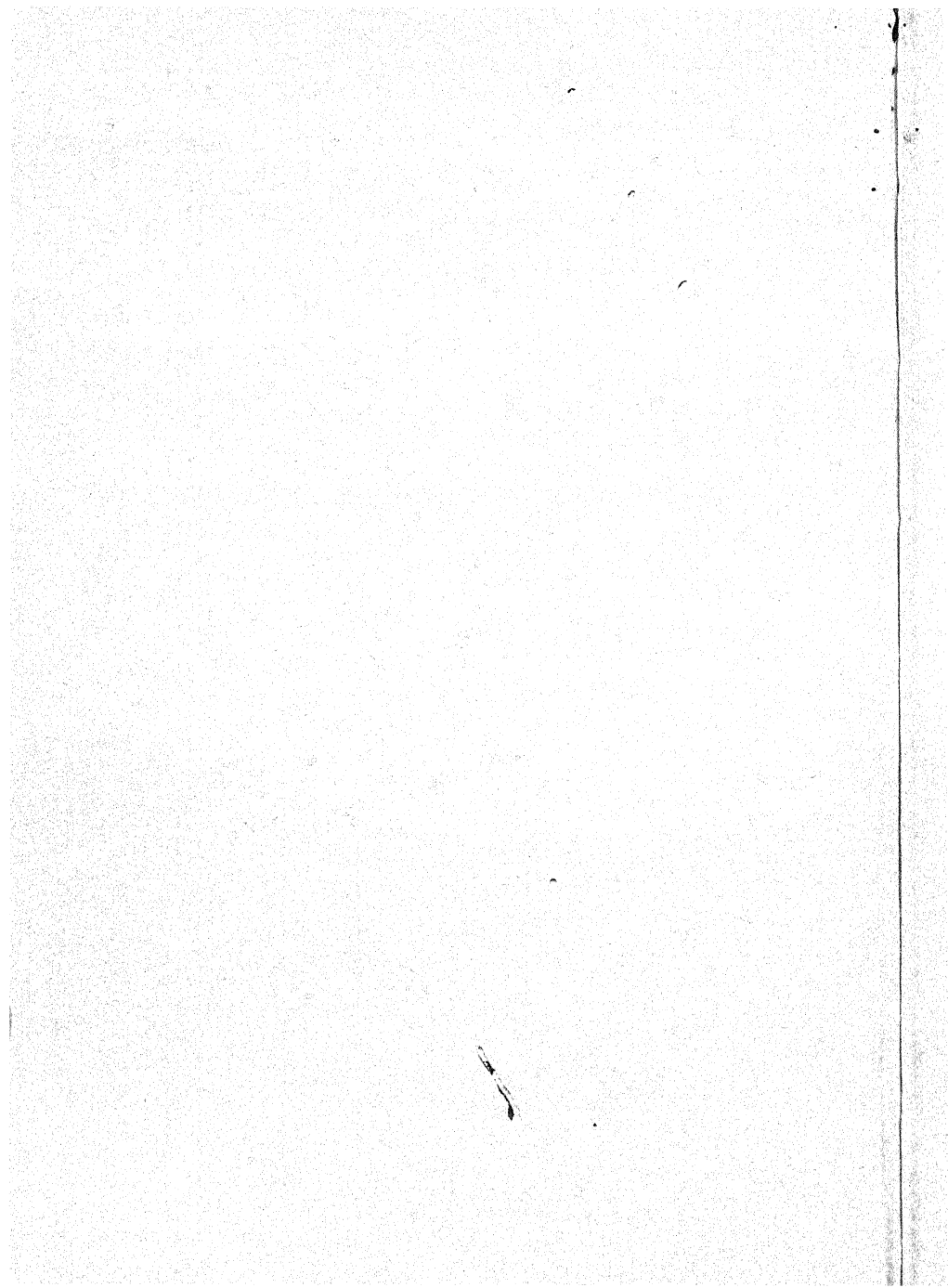
Bacon factories once existing in every agricultural area in the Country, the growing of pigs will follow.

In regard to supplies of food for a greatly enhanced stock of pigs, as indicated in another Chapter, if home food production is seriously adopted as a National policy, there will be a surplus of more than 2,000,000 tons of offals from the increased quantities of cereals which will be grown, while an increased output of Barley is also in the programme. Barley has 90% of kernel, or meal, as compared with 75 to 80% from wheat and 60 to 65% from oats. Barley meal is, therefore, the most economic way of feeding

pigs when grain has to be grown for them. The wheat offals, however, are very valuable food.

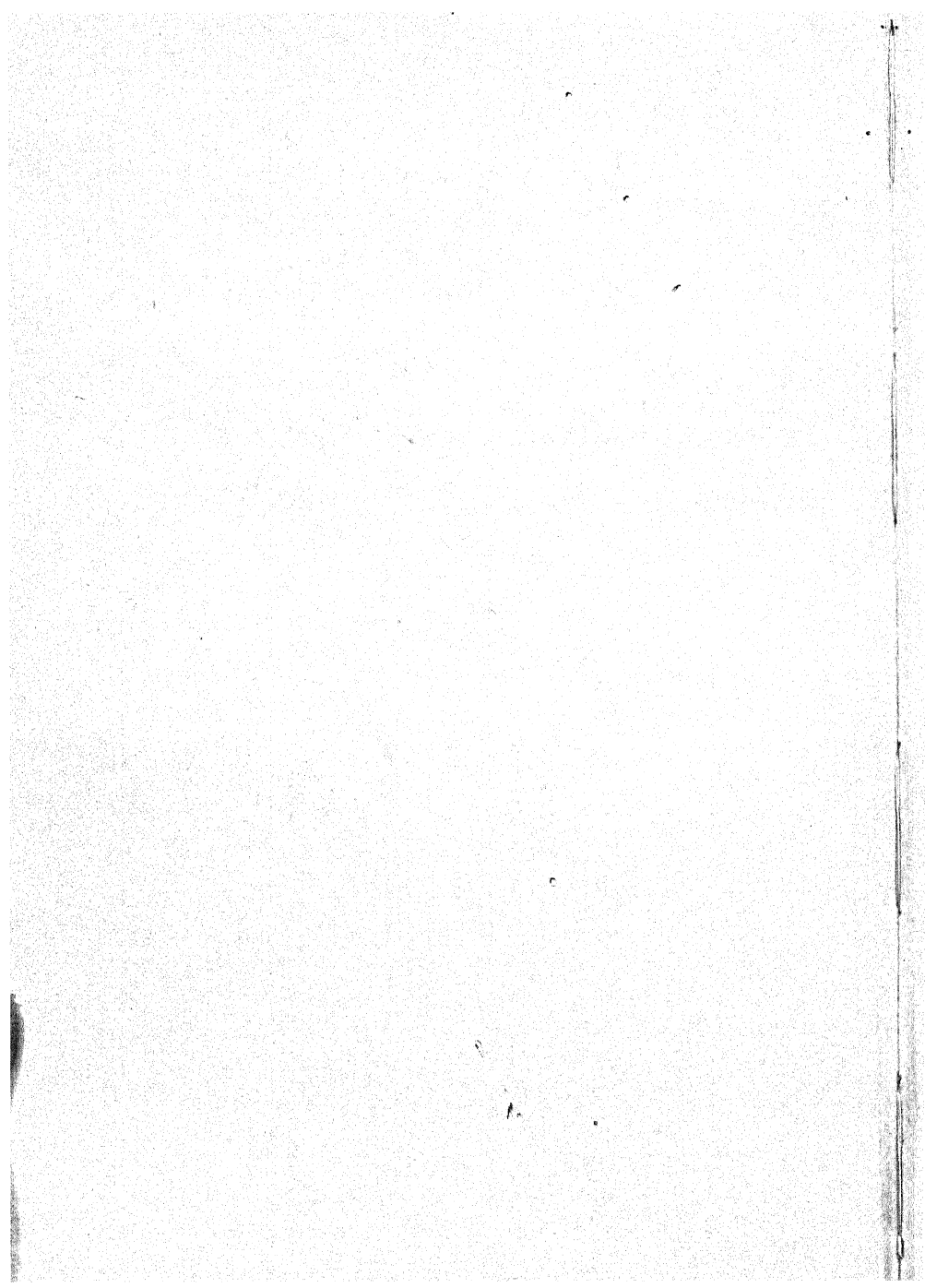
From the time the pig is weaned, until it is fit to kill, every $4\frac{1}{2}$ to 5 lb. of meal and offals given to a well-bred animal, under suitable living conditions, produce 1 lb. of pork. Therefore, the additional offals and barley mentioned above will supply the entire food requirements for the production of the 500,000 tons of pork and bacon which we now import.

German scientists have ascertained that 44% of the Calories are regained as human food from the rations given to pigs. A fat Ox gives only 14% as human food, of the Calories it has received in the nutriment of its food. In its milk a cow gives back for human food about 24% of the Calories supplied to the animal. We have never sufficiently appreciated the great economic value of the pig.



CHAPTER XV

LAND OWNERS AND FARM RENTS



RICH manufacturers have now become the wealthy people of the Country, but up to forty or fifty years ago, the Landowners were looked upon as the Rich people. An idea once established is apt to cling and many Townspeople—not brought in contact with country affairs—no doubt still look upon the Country Landowner as the rich man who is still making a fortune out of farm owning. They consider that at least part of the present crisis in Agriculture is caused by the crushing rents extorted by Landowners.

If, however, the dweller in the town will examine the Government Returns, he will find that the total rents paid for all agricultural land in the Country is, comparatively, not at all a large sum.

Rents have, in any case, been gradually diminishing. In the year 1880 the gross amount landlords received from all farm rents was £59,000,000. During the next ten years they had diminished to £47,000,000 a year, and in 1901 they were down to £42,000,000.

Rents varied little from that period up to the present day and, in 1913, the total agricultural rents received by Landowners was still £42,000,000.*

* It may be noted that the annual value of all agricultural land in England and Wales was ascertained by the Rating Authorities in 1912 as £23,900,000 per annum. The gross rental supposed as stated above to be paid to landlords seems, therefore, much too high.

It must not be assumed, however, that the Landowner collects his rents for his own benefit alone. Only a part—and that not a large one—of the £42,000,000 goes into the landlord's own pocket.

First of all, Income Tax and Super Tax absorb about £19,000,000, which goes direct to the State.

Then repairs, renewals of farm buildings and accommodation roads, gates and the external fences of the farm, have to be kept up by the landlord, and about £7,000,000 a year is needed for this purpose.

A landlord has also to pay for technical help he is bound to get from lawyers and surveyors, collectors of rents and like expenses, as well as for fire insurance, all of which have to be incurred in connection with leases, tenancies, disputes with local authorities and various other questions. This absorbs, on the average, about £3,000,000 a year.

The sum left for the landlords of Great Britain to dispose of is therefore about £13,000,000—that is to say, 8s. an acre on the average from all farm lands.

The cost of management of the estates, interest for mortgages, and for borrowed capital, has to come out of this. As to the management expenses, the owners of large estates usually have to pay for the services of whole time Agents, or Stewards. Otherwise they have to employ firms of Land Agents to manage the property. This expense will work out at about 3s. an acre.

If the landlord is sufficiently skilled and devotes his own time to managing his estate, that 3s. would be set off against the time he employs and would,

therefore, be due to him for his time, and not in respect of owning the land.

Five shillings an acre, therefore, is left to the landlord as the owner of the land, out of which the interest on any money his Ancestors may have borrowed on Mortgage has to be paid.

Some extreme Party Politicians, having a very limited knowledge of such facts, propose to take away land from its present owners, without any compensation for the theft, placing it in the hands of the State as the owner, and would devote the surplus left after State Management expenses are paid, jointly to the benefit of the Farmer and the Agricultural Labourer.

First of all, however, the State would have to take at least as much taxes as it is at present receiving from the landlord. It would have to pay the costs of repairs, replacement, technical help, insurance, etc., so that there would only be £13,000,000 left in the coffers of the State in respect of landowning.

First, out of this the Civil Servant management would have to be paid in lieu of that now given by the owners and their salaried agents. Supposing, as is most improbable, that Civil Servant control would not cost more than the 3s. an acre now involved under private ownership, the State would have an available remainder of about 3s. 4d. an acre.

How would this divide out between the Farmer and his workmen? Take a typical instance of a Farm of 100 acres on which the Farmer and four men carried on the operations. The 3s. 4d. an acre represents £16 12s. Allotting £6 12s. to the Farmer, £2 10s. a year would be left for each of

the Labourers, or say 1s. per week each in extra wages.

It would look, therefore, as if the only person who would benefit by replacing the present landlord system by State ownership, would be the Farmer and that only to the extent of 1s. 4d. an acre in rent. There are amenities of Country life such as low-rented Cottages, help in sickness and other incidentals resulting from residential Squiredom, which it is hard to appraise in cash, on a well-managed Estate, which, however, arise from the present form of ownership. These would not readily be exchanged by the agricultural labourer for absentee Landlordism, for Bureaucratic control and State-owned land, even with 1s. a week extra pay.

Is it worth while to upset all the old traditions of the English Countryside, and contemplate the destruction of the whole class of Country Gentlemen, from whom have come so many honest rulers and most valued officers of the past? If he had his choice, it is doubtful if any Farmer would give up a good Landlord to become the tenant of the State and subject to Civil Servants' "forms," in order to obtain a reduction of rent amounting to only 1s. 4d. an acre.

There is no quarrel between Landlord and Tenant in this Country to-day. The Act of 1920 gave Farm tenants an absolute security of keeping their Farms, and a very heavy compensation if, through any cause, they were to be turned out.

It seems very doubtful also whether State ownership and the cost of Bureaucratic management of the 500,000 farms of the Country, could be carried

out for even the whole sum of £13,000,000. This is all that would be left to the State for control management, and for division between farmer and workmen. It seems more than likely that if the State owns the land, even without having paid anything for it, the population of the Country at large would have to contribute something to the cost of Civil Servant control and management, and that the Farmer and his labourers would not get one penny of what is now called the Landlord's rent.

This is not a political treatise, but the Town worker ought to have the facts put before him so as not to be uninformed on agricultural matters, when statements are made by people who, with the best intention, use wrong facts as arguments towards reaching ideals which are economically unobtainable.

In addition to pointing out that Landowners as a class are no longer the "Rich men" of the Country, it may be well to show that, as a Political power, the Landowner has also ceased to have any weight.

He was supposed to influence Parliament and get new laws made for the personal gain of his class. If this was ever so, such power has now disappeared.

In the Parliament elected in November, 1922, only nine "Landowners" were elected as Members out of the 615 Members chosen. Town dwellers need, therefore, have no fear of undue influence in the matter of Farm rents, or Landlords' benefits being used in Parliament in such a way as to increase the cost of their food.

Especially is this impossible because there are

also nine Tenant Farmers who are Members of the House of Commons, and they would by themselves counteract the Landlords' votes. It should also be noted that the Factory and Business interests of the Country are represented out of all proportion by 322 Members. These are either Manufacturers, Shipowners, Merchants, or directly connected with making or transporting of something, i.e., they are not connected with and indeed have interests directly opposed to landowning. There are also 86 Lawyers, 25 Journalists and 71 other Members who will see that Landowning is not too profitable.

The Trades Union officials in the House of Commons alone outnumber by ten to one the Landowners, and it is to be presumed that Trades Union Officials are sent to Parliament to guard the Town workers' interests !

When in the future there is a House of Commons with a Labour majority, no doubt the question of a Capital Levy will be carefully considered by the then Cabinet. Whatever decision may be arrived at in regard to other forms of property, the facts brought out above will require consideration and investigation before any policy of sequestration could be economically applied to Landowning.

Everything indicates that the Nation and, therefore, the Town dweller, and the wage earner, would make more in future by letting the Landlords continue to work for them by managing their own Estates, paying over to the State, as they do at present, in the form of Taxation, all the excess profits that arise out of the land and its rents.

The wage earner who has saved a bit, and bought a house, would not like to have it taken from him by the State without compensation. The British workman is a fair-minded man and will feel ashamed if, while his own house is left him, the Landowners of a Country, who have got their savings in land and houses, are forced to give up their property without compensation. He will also realize from the above figures and facts that there is no material advantage to be gained by paying the Landlords considerable sums in order to transfer their Farms to State ownership.

The wage earners and town dwellers in general will, therefore, consider that it is best to leave things alone and let agricultural land be owned as it is at present, the State taking the cream, as they do in the form of Taxes.

It is obvious, therefore, that the old idea that rich Landowners are bleeding the whole Nation is grossly exaggerated and altogether out of proportion to the actual state of affairs to-day.

Readers should remember and should make Reformers note that what is left for the Landowners' own benefit is only one twelfth part of the sum that food consumers seem willing to pay the bakers, butchers and milkmen in excess of what these people pay the farmer and expend on their own reasonable costs. When realizing these facts, voters will desire to turn Reformers' energies from exploiting the Landlords' £11,000,000 to saving a large part of the middleman's wasted £145,000,000 for the benefit of the people at large.

One more figure on this subject—if what the Landowner receives for himself out of the ownership of land was distributed equally amongst all the people in these islands, each person would receive under 5s. a head each year.

All I am out for in this volume is to state all the facts and so convince the Townsman that his and the Country's economic salvation is bound up in producing all our own food and producing it at a very low cost.

That when we have the benefit of improved cultivations and intensified output, the costs will eventually be lower than those at which we can import food, but it does not seem that in the reduction of costs, State ownership, or Land Nationalization, will play any helpful part.

The kind of alteration in the form of ownership of land that will undoubtedly help to cheapen production of food is by increasing the quantity of land farmed by the same person who owns it. This is either brought about by the purchase of his Farm by the occupying Farmer, or by the Landowner farming more of his farms himself. Steps in this direction are all towards true National economy. Anyone taking steps towards farming the land he owns must, of course, be equipped with knowledge, have common sense, and be sufficiently supplied with capital, and possessed of energy.

During the years 1919, 1920 and 1921, the process towards the increase of owner-occupied farms was certainly advancing with considerable strides. In 1919 only about 2,000,000 acres were farmed in

England and Wales by "Occupier" owners. At the end of 1921, however, the acreage had increased up to 5,250,000 acres. Then came the betrayal of the Farmer through the cancellation of the Corn Production Guarantees, which had previously been given by Parliament, and a debacle was caused in British farming, from which it will take long to recover.

Until some form of security is forthcoming and Farmers know they are safeguarded, land purchase by occupiers of farms is not likely to proceed.

Another means towards the cheaper production of cereals and also the production of Sugar in this Country is a tendency in the direction of the establishment of Limited Liability Companies with large capital, which will be able to own and develop cultivation of big areas on intensive lines, and on a very economic basis. Capital for Limited Liability Companies is more readily forthcoming, because the investor can put in a moderate proportion of his capital, and pay brains and knowledge to manage it. The individual Farmer generally has to put all his eggs in one basket, and may not himself have the commercial skill, or the scientific knowledge, which a Company with large capital can hire, even though he may individually have the technical experience.

As to the Sugar question, there are very few people who, as single individuals, have enough money to invest £150,000 in a Sugar Factory, and find a further £50,000 for working capital.

A Company which might buy a block of 5,000 to

10,000 acres of what has hitherto been considered comparatively poor land, at about £15 an acre, might very well, by spending a further £10 an acre in strenuous cultivation, and adding large stocks of fertilizers to the soil, make that area equal to some of the best land in the Country and get large profits on its expenditure.

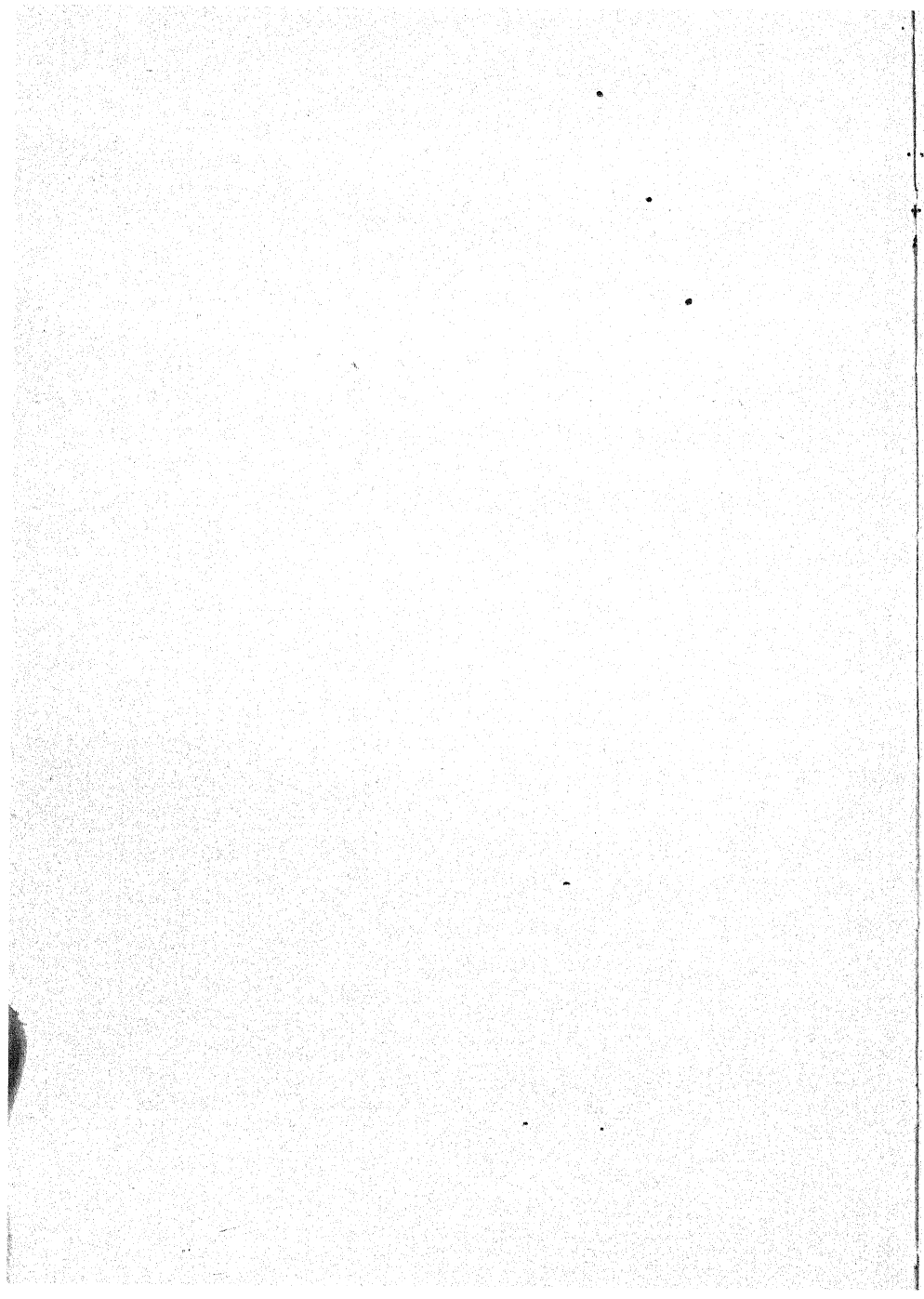
It has been calculated that a reduction in costs at the rate of 10% to 12% can be made on a 5,000 acre undertaking as compared with the figures for a 250 acre farm. When once security is in sight, landowning and farming by large Limited Companies will, undoubtedly, greatly help to reduce the cost of the Townsman's food.

At present the holding of Farms in England and Wales is in the hands of 435,000 Farmers, but it will be noted from the following Table that, while 94% of the land is in the hands of half the total Farmers, the other 6% is held in farms of from 1 to 20 acres in size by nearly 200,000 Farmers :

TABLE XX

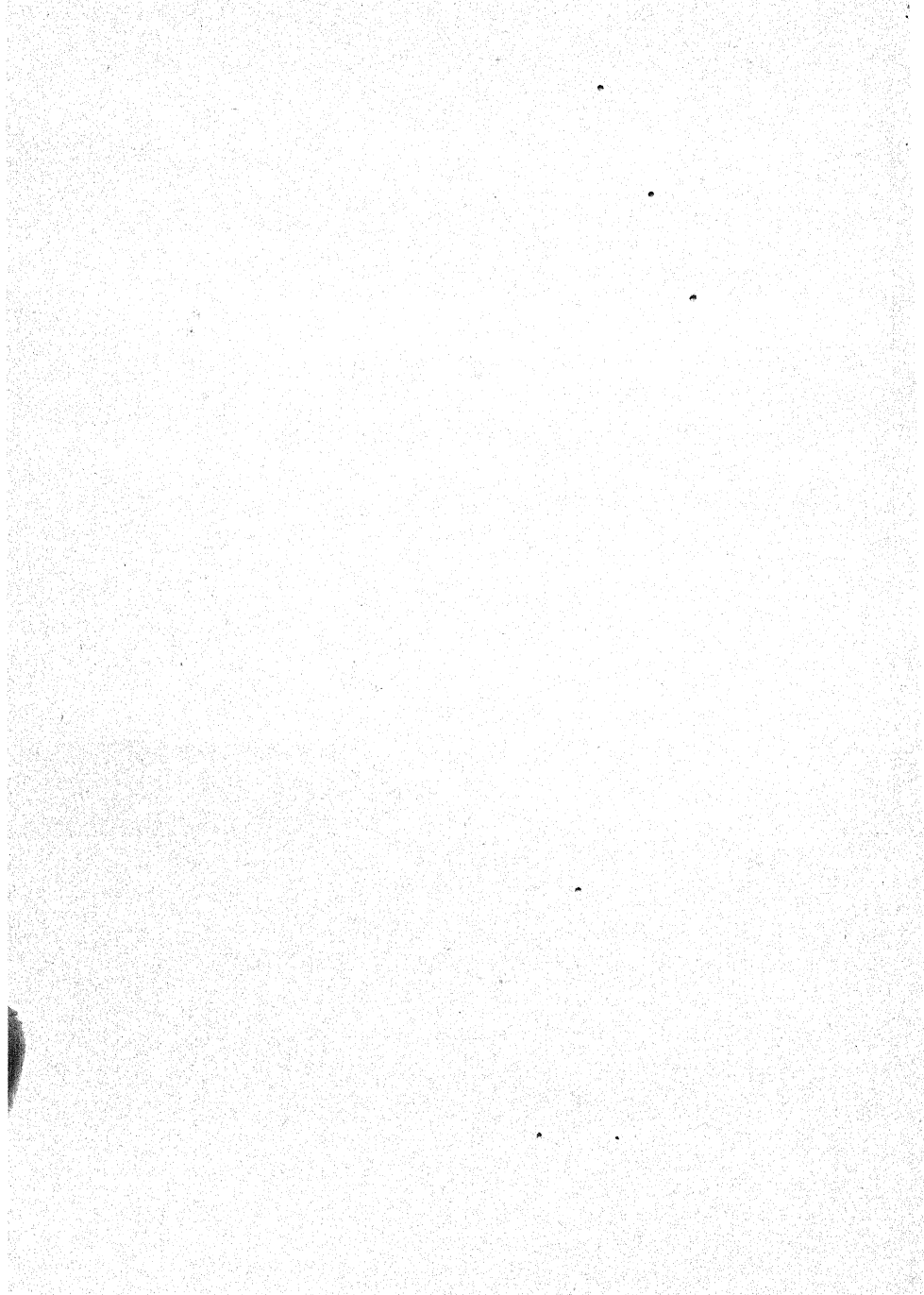
AGRICULTURAL HOLDINGS—ENGLAND AND WALES

GROUP.	SIZE OF HOLDINGS. Acres.	IN EACH GROUP.			
		No. of Farmers.	Percentage of Farmers.	Total Acres.	Percentage of Acres.
A.....	20 to 50	78,454	18	2,636,094	9.72
B.....	50 to 100	59,514	14	4,340,952	16.01
C.....	100 to 150	31,860	7	3,940,343	14.53
D.....	150 to 300	37,615	9	7,848,424	28.95
E.....	Over 300	14,413	3	6,698,221	24.70
Total	over 20 acres	221,856	51	25,463,940	93.91
F.....	1 to 5	91,570	21	282,980	1.05
G.....	5 to 20	121,698	28	1,366,900	5.04
		435,124	100	27,114,004	100



CHAPTER XVI

LABOUR AND EMPLOYMENT IN AGRICULTURE



THERE is room in British Agriculture for the employment of several millions of people, in addition to those who are at present working on our Farms and gardens. If we produce at home, instead of importing, there would be an additional £200,000,000 a year to go to those directly employed in Agriculture. The Farmer who runs all the risk and does the brain work would, naturally, receive individually somewhat more than the farm or garden labourer, but if, on the average, £2 a week per head was assumed for farm and garden labourer, the above additional amount which the Agriculturist could receive would give a good living to 2,000,000 extra people.

The Town worker may not look upon £2 a week as a good wage, but when it is remembered that the average unskilled labourer before the War got less than 30s. a week in the towns, the amount is not inadequate, because the above £200,000,000, or £2 per person per week, is on the basis, not of present costs of food, but on the prices of imports of 1913.

In thinking of an agricultural wage as compared with a Town wage, the following facts must also be remembered :

In a town a man and his family have to pay at least 10s. a week rent for a very small house. In

the Country the agricultural labourer pays from 1s. 6d. to 2s. 6d. for his cottage.

	Per Week.
	s. d.
There is, therefore, a saving in rent of.....	8 0
The country labourer also has a garden which enables him to produce, say :	
20 lbs. of potatoes a week	1 8
Cabbages, turnips, carrots, onions, peas, beans, lettuce and other vegetables and fruit	1 0
He can keep two pigs a year, partly from his garden refuse and partly by the purchase of about 12 cwt. of meal.	
The pork thus produced saves him	2 0
If his wife will take the trouble, there is practically always waste grass near on which a goat can be kept, giving :	
400 quarts of milk a year at 3d. a quart, thus saving.....	2 0
The country worker and his family do not have to spend so much on their clothes, saving probably	2 0
Total benefit for the country labourer is therefore	15s. to 16 8

Many people prefer, when they cannot be sitting in a pub, or going to a picture palace, to loaf at the street corners, and it is natural for the lads to like to congregate together, but for thinking people and people with any kind of artistic instinct, there are pleasures and advantages in living in the Country, where they get beauty and fresh air for nothing, as well as games and Country pursuits and pleasant though simple village life. Their children grow up strong, healthy and happy. The reverse so frequently happens in the towns. Out of a thousand people born of Town-dwelling parents double the number are invalids and unfit, as compared with people born and brought up in the country.

To those young people who want more entertainment in the Country than in the old days, bicycles are an easy means of transport to the neighbouring large country village, or small town. Given a prosperous Agricultural England, there is no reason why two or three times a month, the milk lorry or local 'bus should not take the older people for an evening's entertainment at the nearest cinema. Village clubs, halls and dances, and cricket and football grounds, are now to be found in practically every rural district, and the former dullness of the country is fast disappearing.

Houses. The population of this Country is increasing at the rate of 1,000 people a day, and, as it is obvious that there is an over capacity of production in most factory and town pursuits, and room for enormous development in the production in country places, the building of additional houses for the ever-increasing population ought to take place in the country hamlets and villages rather than in the neighbourhood of factories and towns, where foreign competition is destroying continuous factory employment.

Before the War a very good modern type of agricultural cottage was being built at £125 each. Prices are not likely to be quite so low as this in the near future, but the land for a cottage and garden in the country costs practically nothing, and other building expenses are very much lower than in towns. Hence the difficulty of additional housing is much easier in the country.

Labour. Unskilled labour, provided the man or

woman wanting employment are not hopeless cripples or incorrigible loafers, could be much more readily absorbed in agricultural work than in town or factory pursuits. For instance, all young lads and lasses can very quickly learn to milk, and, in order to provide all our own food, we must keep an additional 1,000,000 cows. To look after these and superintend the feeding and milking, there must, of course, be skilled men, but 20,000 such skilled men would be sufficient, and 75,000 unskilled hands could be employed in connection with new cows alone.

During the War two or three experienced men on a farm, with the assistance of a dozen unskilled workers, were able to get the work carried on, and, while the Farmer had a little more trouble in supervision, yet the writer, who was responsible for the allotting of 120,000 untrained people to the Farms, remembers that there was no trouble of any magnitude in getting them absorbed and used up for agricultural work. All that is necessary is the goodwill of the Farmer and his nucleus of trained men to work the new hands in, to the best advantage.

Farm work, on the average, is certainly not as laborious or tedious as factory work. The milking and feeding of cows does not take more energy than the adult worker expends in a cotton or woollen factory.

The ploughman is following his horses across the field perhaps a hundred days in the year, and, in doing so, walks less than half the usual postman's rounds, viz., he walks only seven miles a day, guiding the plough, without using much exertion, except at

the end of the furrow. Morning and night he has to groom his horses and feed them. When he is carting he has to help load his cart with manure, roots or the like, and this means lifting with a fork or shovel probably about 8 to 10 tons a day.

A boilerman, a man shovelling ore or coal, or loading iron, does two or three times the amount of lifting work, and is not riding a good part of his time in the empty cart or wagon.

People working with cows are mostly employed under roofs and on very wet days ploughmen and carters are found work in the sheds. In fact, the weather is not nearly so severe on the agricultural labourer as it is on the sailor, policeman, postman, etc.

There are so many varieties of work in connection with Agriculture and Horticulture that it should not be difficult to anyone taking up the life to find the kind of thing that suited him.

We will leave out the Farmer himself from this part of the discussion, because it is intended to apply to unskilled workers. The Farmer has to be a very skilled man, perhaps more when he is in a small way of business than on a large scale, because when working a few acres, he cannot get the experience of skilled workmen to pull him through.

The novice, however, if he is intelligent and keeps his eyes open, and works hard, can, in a very few years, have learnt enough to start for himself if he has got the capital, or if he has not, then the exceptionally good man will always find a position as foreman or bailiff at wages better than the average.

Leaving out that branch of Agriculture which is

based on the scientific knowledge of the chemistry of crop production, probably the most difficult part to learn, and that which requires longest training, is connected with the breeding, rearing and preparing of animals for the market, and all that pertains to the diseases of animals is particularly difficult. A Farmer can always get a Vet. for any important and abnormal difficulty with an animal or herd, but it is the cowman, stockman or shepherd who must really know and observe the health and condition of the animals he is in charge of from day to day, and nothing but long experience will teach him. Even with training, the man without "horse" sense cannot learn this part of farm work.

Some novices have a peculiar facility for picking up knowledge about, and judging the quality of animals, and those who are very keen on this side of the business can always get a living as a helper, and gradually train themselves on.

A man who wishes to train himself to become a Small Holder or Farmer should make up his mind, at the earliest possible time in his career, whether he thinks he would succeed best when trained to control :

1. A Plough Farm,
2. A Grass Farm, or
3. A mixed Plough and Grass Farm,

or whether he would like to devote himself entirely to :

4. Milk Production,
5. Beef Production,
6. Pig Production,

or whether his bent is towards :

7. Intensive Fruit and Vegetable Production on a farming scale, or

8. On a Market Garden Scale.

Or if the individual has no prospect of any capital and yet wishes to become his own master, he would probably devote himself for several years to working hard and saving something, while learning the business of intensive market gardening, or poultry work, so that he might eventually establish himself on a small piece of ground and grow such vegetables and fruit, poultry and eggs, as would give him something to sell in most months of the year.

There are many ways in which an increased number of workers will be wanted for agricultural pursuits as this Country gets to grow more of its own food. The existing forms of labour in Agriculture may roughly be divided as follows :

PERCENTAGE OF MALES EMPLOYED IN VARIOUS AGRICULTURAL OCCUPATIONS.

	%
Farmers and graziers and adult relations working with them..	27
Farm bailiffs and managers	2
Shepherds	2
Cowmen and cattle tenders	6
Horsemen, ploughmen and carters	11
General farm labourers	40
Nurserymen and market gardeners	5
Other gardeners, not at private houses	5
Mechanics and other workers	2
	<hr/>
	100
	<hr/>

The last class, that is to say, motor tractor drivers, and the like, are increasing and will increase, but at the expense of those looking after horses.

The farm Tractor is a very simple contrivance and

its use and working can be learnt in a few days by any young active man of average intelligence. He can, with a little experience, do what are called the "running repairs" and put in the spares, and replace working parts. The Agricultural Machinery Repair Works of the district, and the local Garage owner, are immediately at hand for any repair which cannot be carried out on the Farm. Tractor driving is a new form of employment very acceptable to the young men of the country with a bent for mechanical work, who formerly had to drift to the towns to find this kind of congenial employment.

The breaking up of grass land and converting it into arable farming will have a great effect in increasing the amount of labour required.

In Somersetshire and Leicestershire, the two worst grass Counties, the number of farm labourers employed per 100 acres is less than three, while in the plough Counties such as Suffolk and Cambridgeshire, more than six are employed.

In Somersetshire Farmers only employ 18,000 workers. From a much smaller area farmed in Suffolk, 31,000 farm hands are employed.

Where very extensive cultivation is practised, by which is meant producing a specially large amount of food from a given area of soil, the number of men employed is very large. As an example, a farm of 150 acres in the Wisbech district formerly employed only three men and a boy. This same piece of land is now being farmed intensively and is largely used for fruit, vegetables and potatoes and now employs rather over 100 workers.

As another example of unintensive farming, we may use, as an illustration, a 200 acre farm in the South of England in which the Farmer and one man only, look after 30 or 40 young cattle and 2 or 3 cows. The neighbouring 200 acre farm is ploughed up and used for the growing of cereals, with occasional crops of roots and forage for cattle, and though this is not very intensive farming, in addition to the farmer himself, ten hired people are employed.

If, on the other hand, the same 200 acres were used for still more intensive production, which would include three corn crops out of four years on most of the land, with a quarter of the land each year producing field crops of vegetables, small fruit and some hops, etc., 35 to 40 men would be employed regularly.

From the above and what follows, it will be seen that there is ample occupation, at moderately good rates of wages, for the employment of a very large number of additional workers in the Agricultural business if it becomes developed.

Of course, the man who does not really want to work has no more opportunity of making a good living in Agriculture than in any other branch of life. There are branches of farm work which do not require much heavy manual labour, but in every branch some physical labour is required, and no one—whether on the farm or in a factory—can make a good living unless he applies himself seriously and continuously to the work in hand.

In plough farming on a large scale, there has always been a difficulty in finding work for the whole agricultural population during three or four months of the

winter. Especially is this the case in those Counties where very little Woodland exists. In such Counties as Devon, Hampshire, Kent, Norfolk, Sussex and Wiltshire, however, where there is a good deal of woodland, many men are employed in winter in the cutting of underwood for faggots, for fencing material and in timber felling and bark preparation.

The advent of home Sugar growing will be a great help to continuous employment of labour in many agricultural districts, especially as the best areas for Sugar growing are those in which little of the ground is given up to Woodland.

Assuming 500 workers are employed in a Sugar factory from October to April, which is the season for making and refining Sugar from the Sugar Beet, these workers would go out in May to the surrounding farms and help to put in spring crops, to begin thinning out the Sugar Beet plants and hoeing the ground in the Beet fields. The hoeing operation between the rows of plants has to take place three or four times during the season and would thus keep the workers employed, except when needed for hay harvest, until the corn harvest is ready.

The Sugar Beet workers would then supply the extra hands needed for harvesting hay and grain. Afterwards they would go on during the later autumn to the digging of potatoes and the getting up and carting of the Sugar Beet to the factories.

All other agricultural countries of Europe are making a great success of Sugar Beet growing and the continuous employment of labour thereby.

If we grew our own sugar, there would be an extra

£15,000,000 to £20,000,000 a year to spend practically all upon wages in this Country.

It was largely through Sugar growing that Germany, forty years ago, began to learn the art of employing an enormous part of its population in general Agriculture. They increased the work and the output in every branch of production from their soil, so that in the year before the War, with a population not reaching double our own, they were employing permanently in Agriculture, 10,000,000 people against the 1,350,000 people so employed in this Country now. We employ in Agriculture at present the same number as were employed here in 1850—we have not increased in seventy years.

In like manner 8,000,000 people are engaged in French Agriculture out of a population smaller than our own, and a more happy, contented and prosperous citizen population it would be hard to find in the whole of Europe. They are the backbone of the French people and of the prosperity of France.

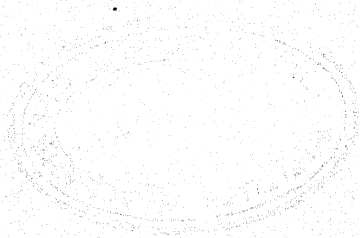
Belgium, Holland, Denmark, Spain and, to a large extent, Italy, are all countries which are self-supporting in food production, or even some of them, like Denmark, are large exporters of food. Trouble never seems to arise in any of those countries for their Agriculturists, nor does political trouble in the Country or outside it, occur through them. They are not down-trodden, over-ridden people, half starved through the unfair treatment meted out to them by Governments entirely obsessed in favour of Export Manufactures. Those countries all export manufactured goods, but they secure first of all that their

people are self-supporting at home and that it is only the excess of home requirements which is allowed to go abroad.

Labour in this Country has never grasped the fact that a country must make the utmost use of those Raw Materials they possess, up to supplying 100% of the Country's own needs from their own Raw Materials. In the case of this Country, coal, iron ore and home-grown food are all the Raw Materials we have, and we make very little use of the last.

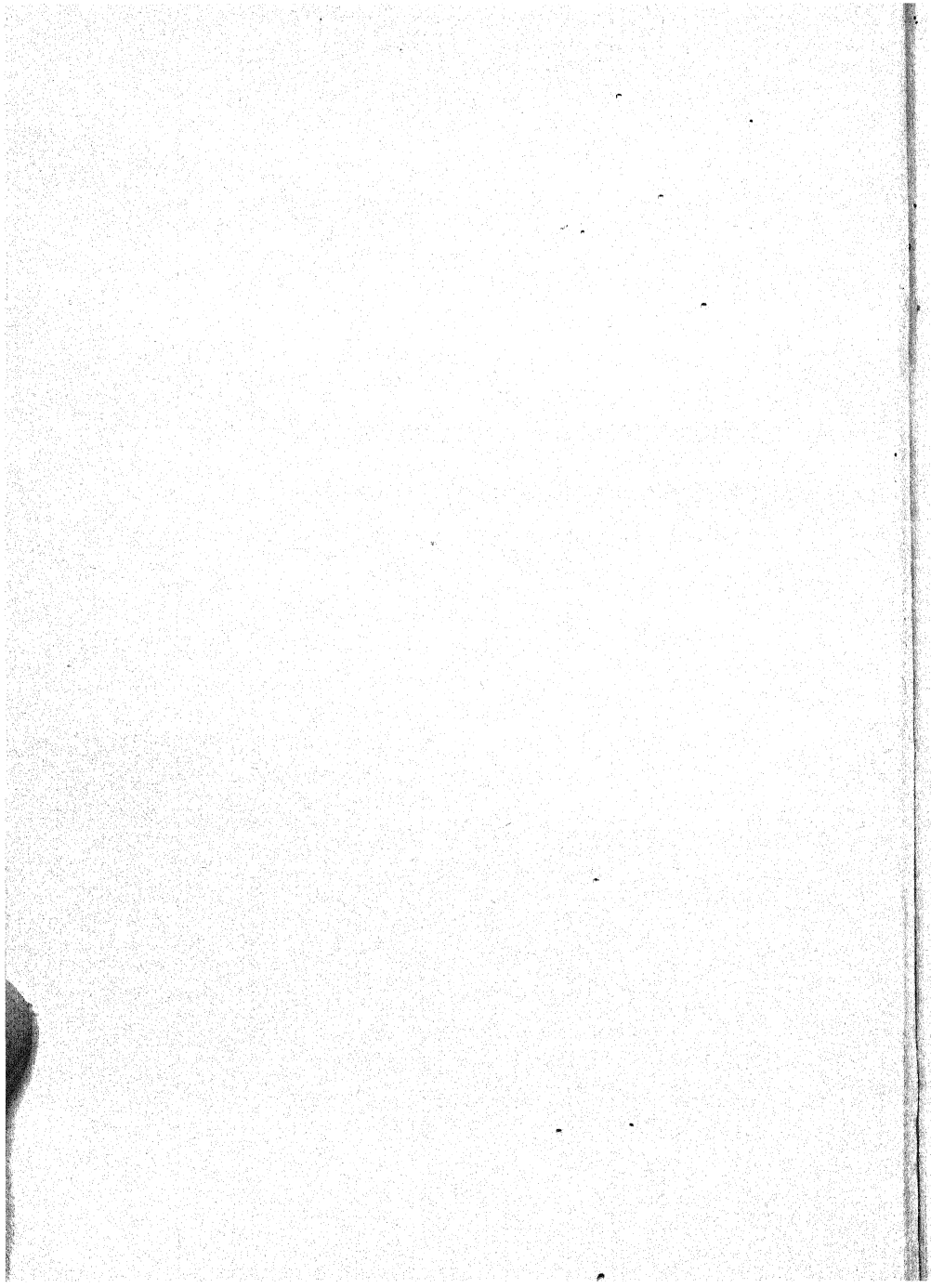
What does it profit the factory worker if he gets 3s. a week more wages for nine months of the year, and the other three months is out of employment through want of foreign markets, as compared with working twelve months of the year—even if his food did cost 3s. or 4s. a week more? He would keep going the whole time, through selling nine months to the foreign markets, and three months to the increased number of workers on our own land. He cannot have it both ways.

Unless he is contented that the land worker shall make a living, he cannot have that land worker as a customer for his town-made goods because the land men will have ceased to exist, if the town worker insists upon buying his food from the Argentine and the States. The money paid abroad for such imports eventually goes through the American farm workers to the American factories and towns.



CHAPTER XVII

EDUCATION, RESEARCH AND DISTRIBUTION OF KNOWLEDGE



UNTIL about a century ago, the production of human food increased in the British Isles about in the proportion to the increase in the population, and England provided all her own food. The methods of production became less and less crude as civilization and the number of the population increased.

In prehistoric days, the dwellers in caves and huts got their food by slaughtering the wild animals and by pounding up berries and roots into a kind of flour. The cultivation of the land for the growing of bread-making material began in a crude way at the time when the population commenced to occupy houses and became settled into communities. The pestle and mortar for preparing flour gave way to the use of millstones, which were driven, first, by human agency, through the use of criminals and slaves, afterwards by horses and oxen.

It was not until after the Norman Conquest that windmills were used for grinding purposes in this Country.

Up to the time of Elizabeth, plough land cultivation was not carried on to a very large extent, and what was done was controlled or owned by the large Land-owners and the Religious Establishments. Most of the herds of cattle were also owned by these interests.

From the time of the Stuarts on till about the year 1770, English Agriculture was gradually developing, though still in a very backward state. The land was getting split up into farms to a much larger extent than formerly, and cultivation of plough crops and the ownership of flocks and herds were becoming much more diversified, although, in most districts, fenced enclosures had not yet been established and a great deal of the land now under cultivation was then in the form of barren waste.

From about the year 1775 and onwards great strides took place in the methods of Agriculture and in ownership. The Country had then some leaders of Agricultural reform. Mr. Coke, of Holkham, in Norfolk, was one of the great leaders. He advocated and practised the bringing of Agriculture into some kind of organized system. From those days may be reckoned the development of the rotation system of farming, of enclosures within fences of all land of most value for Agriculture, of the retaining as heaths and commons of only such land as could not be made into fair agricultural land by proper cultivation. From this time also dates the establishment on a very permanent basis of the tenant farmer.

By the gradual bringing into cultivation of land hitherto untouched and unfenced and through the continuous cropping of plough land which was begun 150 years ago, the Country owed the increased production of the soil, which enabled the farmers of England to supply all the Nation's needs. Between the years 1700 and 1800 this Country *exported* forty million quarters of wheat and barley. Exports

were no doubt helped by the Bounty then paid to Farmers by the British Government on all they exported. What do the Manchester school think of such methods?

After the middle of the last century, we have, in addition to some improvement in ordinary cultivation methods, to give credit to the Agricultural Chemists who, from the time of Liebig, in 1840, have, as far as they were allowed by the Politicians and Farmers, helped to increase the output of ordinary soils by introducing methods of artificial fertilizing.

In the year 1850, England and Wales employed 1,350,000 people in Agriculture—the same number as are employed to-day. As long ago as 1808, we grew more than 3,000,000 acres of wheat a year and in 1850 over 4,000,000 acres were grown, while we are now down to badly below 2,000,000 yearly.

From about the middle of the last century, the increase in population has overtaken the output of human food from the soil of these Islands, and this has taken place, not because the food could not be provided from the soil of the British Isles, but because, through the introduction of steamships and railways, providing cheap transport from foreign rich, virgin soils, their surplus food was thrown on the English market.

At the same time, the whole trend of thought in this Country was turned on to manufacturing, not only for making those things we require ourselves, but chiefly for obtaining big profits for Factory owners and merchants through exporting every kind of Manufactured Goods. The commercial genius

of the English people enabled them to capture and establish markets for manufactures in almost all foreign Countries, and Agriculture in this Country became neglected.

No one for fifty years, or more, seemed to have given any thought to it, outside those who were directly engaged in farming. No legislation has been attempted to help it, until the pinch of war brought the matter so strongly before public opinion. Even those who were not manufacturers, and who were not strong Free Traders, left English Agriculture and everything connected with it, severely alone.

There was practically no money spent on research or on education. The landlords were not helped by any form of legislation to develop Agriculture in any way. The Tenant Farmer was faced with wheat which was dumped down in this Country from the surplus of bumper crops of virgin soils, at prices with which he could not compete. The Agricultural labourer was so badly paid that he and his family starved on 12s. or 15s. a week, at the time the Town worker was getting nearly treble that amount.

From 1870 onwards some land went out of cultivation. Other land was farmed in such a manner as to give a profit on the crops grown every few years, the intervening crops being worked so as not to make a loss, but not in themselves tending towards the increase of human food to any extent. By the year 1914, we were producing only one-fifth of our requirement of wheat and only a little over half of the meat which our population needed.

In addition to this, we were importing all our sugar,

and enormous quantities of vegetables, fruit, wool, hides and other soil products which we could have produced.

The slough of despond into which the landlord, the tenant and the labourer had got at the end of the last century was appalling. The state of Agriculture left very little inducement to anyone who had scientific knowledge, business training, or other qualifications which would enable him to think out a new process, to turn his attention to Agriculture, as a source of either income or pleasure.

Every politician was thinking of Town votes and there was very little hope of getting them to help or consider Agriculture. Those landlords themselves, who were in Parliament, were frightened to speak for Agriculture because of the cry that they were seeking their own interests. The number and education of tenant farmers were not sufficient to make them a great power in the land, while the rural worker seems to have been so depressed, and so uneducated, and so unassisted that he failed to make any mark or have any political influence in the Country.

During the fifty years prior to the War, the actual amount of land under the plough had been greatly reduced, and altogether in those fifty years the Agriculture of this Country had become less intensive and the output smaller than in the years immediately before 1870.

Agriculture showed some slight signs of recovery from about the year, 1905 till the beginning of the War, and, during the last two years of the War, the Food Production Department's Campaign naturally turned

the Farmers' thoughts towards more intense production. Many of them, at the end of the War, were, by reason of the Premier's speeches, the passing of the Corn Prices Guarantees Act and other causes, becoming more hopeful of security in the future, and then—like a bolt from the blue in 1921—came the tearing up of the Government five years' Contract with the Farmers guaranteeing them against loss on growing wheat, and such a slump set in as carried the Farmers of the Country off their feet.

At the time of writing, spirit is entirely lacking and a crisis exists in Agriculture which is gradually bringing on one of the greatest calamities the Nation can suffer.

* * * * *

There are many ways in which the future of Agriculture can be helped, improved and indeed, secured. The chief, of course, is security under which our needs of food can be regularly grown at home instead of being dependent on the dumping of surplus bumper crops of other countries.

Leaving alone for the moment the question of prices for wheat and meat, Agriculture, as a whole, and individual Farmers themselves, may be greatly assisted by the much required increase of :

1. Agricultural Education ;
2. Agricultural Research, and
3. Agricultural Intelligence.

A certain amount of energy has been put into Agricultural Education in this Country since the War, but little is being done as compared, for instance,

with the Agricultural education of Germany, on which, in 1910, £200,000 was spent on half a dozen Universities. Towards this expenditure the German Government subscribed about half the cost.

The sum spent on education and on research in this Country is trifling, when it is remembered that we could grow an additional £300,000,000 worth of food. When we compare that vast sum with the value of several of our other industries, it shows how out of focus all ideas have been in the past as to the importance of Agriculture.

Is it realized that the food imports we could have produced in 1913 were three times as large as the total value of all the Coal we produced; were in fact ten times as large as the value of all the Pig Iron we produced? One year's home production of our additional requirements of food would give us a sum equal to the total Savings Bank Deposits of the whole Kingdom, or it would be equal to fifteen times the total Life Insurance Claims paid in a year, or six times the total deposits at the Bank of England.

Can the Nation not afford half what Germany formerly spent on Agricultural Education and Research with such a possible saving in front of us?

Under the heading of Research, is it realized that we do not even know enough about the available plant foods in the soil solutions to prescribe at all accurately the amount of fertilizers that should be used on different soils? We Farmers are told to "try about 3 cwts. or 4 cwts. of Superphosphate;" about 5 to 10 cwts. of Basic Slag, while of material costing 12s. a cwt., such as Nitrate of Soda, we are

told to put on from $\frac{1}{2}$ cwt. to $1\frac{1}{2}$ cwt. per acre. No systematic soil sampling of the Country has been done, so that our scientific advisers cannot be more exact.

New methods of accurately ascertaining the soil solutions are required, and they can only be developed after patient and costly research. A few of our most highly-trained Agricultural specialists know something, but very little, of the nature and effect of Enzymes in the soil. They know that Chlorophyll serves certain purposes, but the bringing of the functions of these substances into practical contact with everyday Agriculture in their due proportions has hardly been attempted.

The investigation of diseases of plants and animals is still almost in its infancy, and their scientific treatment has not been advanced very far.

The nitrification and fixation of plant food by bacteria is well known in nature, but research will probably find methods of intensifying and enlarging the sphere of this and similar processes in such a way that costs of production of food may be enormously reduced.

To-day some Farmers believe it is most economical to supply Nitrogen and Phosphates to plants by first feeding Cake to cattle and then using the manures. Another large school believes that direct application of Nitrogen and Phosphatic fertilizers is the most economical.

With a little help for Research many of such problems may be solved in the near future, and greatly reduce the cost of food.

Then, again, while we are developing along the lines of pedigree cattle, sheep and pigs, hardly anything has yet been carried out in breeding new varieties and improving old varieties of cereals through selection and otherwise. One man is heroically fighting a whole army of troubles in this battle, but it needs a small army of Research workers to gain full success.

We hear of Human Population, and the Germans talk about Pig Population, but what do we know about Soil Population and the myriads of infinitesimal living entities which inhabit our soils and give, or withhold, fertility, largely according to the way in which they are treated by cultivations and fertilizing foods? Research in these matters may create enormous practical economies.

Wheat straw chemically contains good food for cattle. In practice, it is so fibrous as to rank very low in food value. Processes to make it more easily digestible ought to be worked out.

Nitrogen existing in the soil in the autumn as Nitrate, ideal for plant use, is almost all washed out by the winter's rain. This is a costly and valuable product. Who will find a way to save this through altering the system of cropping, or by other methods?

A simple process is wanted for telling the Farmer the available Phosphoric Acid in his soil and what he ought to add.

Heavy Clays, difficult to work and giving late crops, could probably be greatly improved if the 1% or 2% of colloidal matter they contain could be

dissolved out, or the colloid structure destroyed. How to do this ?

Should not some enlarged and sufficiently financed and supported system be developed on the following lines, for investigating the above and a hundred matters of equal importance ?

Let Cambridge and two or three other Universities be the chief Research and Educating centres for the most scientific side of Agriculture.

Let there be County Testing Stations, College Schools and Observation plots on a well-developed scale, at which practical demonstrations and observations should be carried out in an exhaustive manner, in conformity with the scientific knowledge obtained, or suggested, from the work done at the higher research departments at the Universities.

Let local plots, at which the small Farmer and the more intelligent farm labourers, could observe new developments, be established in each part of each County where different rotations, different kinds of crops, different kinds of seeds and fertilizers, varying depths of ploughing, various frequencies of cultivation and the like, could be used as optical education for carrying out practical work on individual farms on lines taught by scientific research.

At one of the Central University establishments there should be a sub-section watching, noting and distributing information as to what is taking place :

- (a) As to research
- (b) As to statistics

of the Agriculture of all important foreign countries.

The Central Research Department at the Universities, the County scientific practical investigation centre, and the local Demonstration Farms, could very well lay out a programme for the duties of what in America is called the Bureau of Soils. The work of this section of American Agricultural Development has been very helpful. It systematically samples and analyses soils, both chemically and mechanically, and then maps the varying Agricultural soils of the States. Advice is then given to the Farmer as to what each kind of soil is best suited for growing on his land, in the climate existing in his locality.

There is no attempt at such an organization in this Country, and, while a new farmer may get some friend, or land agent, to give him his view as to what he should grow, such advice is a mere matter of opinion and is not based on any record of tabulated scientific facts.

As a general means of disseminating intelligence, the Ministry of Agriculture's Journal should publish continually for the information of the Farmers, the practical results of the scientific research work of the Universities, together with direct suggestions of the cropping of soils. It should also circulate the needs of the population as regards food requirements and the costs of producing from various classes of soil. Generally it should keep up a continuous distribution of information and market prices directly bearing on the numerous and ever-advancing Agricultural problems.

The individual farmer, or even groups of farmers,

can never be sufficiently important to secure an inexhaustible supply of those Fertilizers which have to be got from foreign countries. It is most important, therefore, that the Government should secure that Phosphate Rock, which this Country does not produce, should be made certain to us for generations to come.

In 1913 the world used 10,000,000 tons of Superphosphate :

America produced	3 $\frac{1}{4}$ million tons
Germany " 	2 "
France " 	2 "
Italy " 	1 "
While U.K. only produced	820,000 tons.

The whole output of Superphosphate is made from Phosphate Rock coming from Northern Africa, three of the South-Eastern States of America, and a relatively small quantity from Phosphate deposits in two of the groups of the Pacific Islands.

Except in regard to this Island supply, which, though large, is not inexhaustible, the British Empire has practically no control of Phosphate supplies, and, as will be seen from the Table on page 51, this Country ought soon to be consuming more than 2,000,000 tons a year.

The normal increase of our population will, twenty-five years hence, require an amount of food necessitating the consumption of nearly 4,000,000 tons of Phosphates, and a similar ratio of need will exist all over the World. Within the next three or four decades the scramble for Phosphate Rock will be so severe that those Countries not obtaining it, will be com-

pelled to keep down its population. No substance can take the place of Phosphoric Acid in food production, and, therefore, it behoves the Government to take every necessary step to secure large future supplies needed by our posterity.

In Nitrates we can eventually make ourselves independent of Imports by manufacturing from the air, but at present we use a small portion of the $2\frac{1}{2}$ million tons of Nitrate of Soda exported from Chili, and some of the 1,400,000 tons of Sulphate of Ammonia which is the tonnage of the World's production of that commodity.



CHAPTER XVIII
THE HOUSEWIFE'S PROBLEM



POLITICIANS always seem to fear that, by helping farmers to produce food, they will lose Town votes because Manchester wants cheap food. If they want to gain votes, let them show Labour how to cheapen retail food by diverting two-thirds of the middleman waste, and excess profits, for division between the Townsmen Consumer and the Farmer Producer. This would make the retail price of food, if all was produced in the United Kingdom, cheaper than imported stuff could be sold at, under present conditions.

For instance, the United Kingdom farmer at present gets forty shillings for a quarter of Wheat.

The Cost of Bread is—Per 4-lb. Loaf.

	d.
That is, for the unground wheat.....	3 $\frac{3}{4}$
The miller's costs, plus 10% profit, are.....	$\frac{3}{4}$
Baker's costs at his shop, plus 10% profit, are	1 $\frac{1}{2}$
	—
Total cost	6
The townsman at present pays 9d. for the loaf ..	9
	—
Difference between cost of producing a loaf including miller's and baker's profit and price paid by the consumer is, therefore.....	3
	—

All this 3d. must 'be accounted for between the Miller and the Baker. The Farmer gets none of it.

The details of the above costs are as follows :

ACTUAL COSTS OF BREAD

	Per Ton.	Cost per 4-lb. Loaf
	£ s. d.	d.
The farmer gets for 1 ton of wheat for his cost and profit	8 18 0	equals 3.80
(This is on the basis of 40s. a quarter of wheat.)		
Cost of milling of flour for baker, including 10% milling profit and depreciation in a large, well-managed mill, and after allowing for offals, which are charged back to the farmer for stock feeding at practically wheat price	1 5 0	
Cost of delivering flour to baker, etc.	7 6	
Total cost of milling and delivering	1 12 6	under .70
The ton of wheat gives 75% flour—that is 1,680 lbs. flour.		
The baker adds over 40% water in mixing and drives off only part in baking. A little less than 75 lb. of flour produces 100 lb. of bread, or 25 4-pound loaves.		

Cost of a modern bakery on a 5-ton a day scale :

		Daily Cost.
	s.	£ s. d.
1 Foreman	@ 15 a day	15 0
4 Men mixing and kneading	@ 8 "	1 12 0
5 Master bakers	@ 10 "	2 10 0
10 Assistants	@ 8 "	4 0 0
5 Apprentices	@ 3 "	15 0
1 Furnaceman	@ 10 "	10 0
1 Counter and weigher	@ 8 "	8 0
1 Cleaner	@ 5 "	5 0
		<hr/>
		10 15 0

	Daily Cost.			Cost per
	£	s.	d.	4-lb. Loaf.
Brought forward.....	10	15	0	d.
				4.50
Rent per month	£			
Power and light	18			
Firing	8			
Salt and yeast.....	32			
	17			
Total for 25 working days	75			
Or per day.....	3	0	0	
		13	15	0
Add for repairs and depreciation	10%			
„ „ profit	10%			
		2	15	0
Total baker's cost and profit at shop....	16	10	0	1.42
				5.92

Therefore, cost per 4-lb. loaf with wheat @ 40s. is under 6d. per loaf.

The Association controlling the Master Bakers admitted in November, 1922, that they were still charging on the same profit basis established during the scarcity of war in 1917 for their proportion of the selling price of bread.

If 80% of the wheat consumed in the United Kingdom is used for making bread, then of the 7,000,000 tons of Wheat we consume, 5,600,000 tons are used for making bread. That is, after allowing for water in the baked bread, the tons of bread sold are 6,900,000 tons.

On this quantity at 3d., the unaccounted for part of the price paid by the householder for the 4-lb. loaf, amounts to the enormous figure of £50,000,000 per annum now spent on bread seemingly in excess of what it actually costs to produce under reasonable conditions.

On the 5,600,000 tons of Wheat used, this saving,

which would not be very difficult to organize, is close upon £10 per ton, or more than all the Farmer now gets for each ton he grows.

Offer the English Farmer a guarantee of one-third of this sum, in addition to his present price, for the next ten years, and you will obtain all England's needs of wheat in very quick time from our own soil.

In regard to *Meat*, the British Farmer is now getting about 56s. per cwt. live weight, or 6d. per lb. for his fat cattle. Allowing for the loss of weight, offals, etc., when the ox is killed, this makes the cost to the butcher about 9d. per lb. of beef. The ordinary retail butcher charges about 1s. 6d. on the average of all joints, for the English meat he sells.

The difference to cover butcher's costs and profit and the meat middleman's profit is, therefore, at present about 9d. per lb. The actual costs incurred by a well-managed butcher for slaughter house and shop, do not exceed 2d. per lb., including a reasonable profit, leaving 7d. per lb. surplus. Taking the United Kingdom's consumption of meat of all kinds at 2,400,000 tons a year, there is at 7d. a lb. a total surplus of £156,000,000 per annum for Middlemen's profits, wasteful distribution, bad management and excess profit. But only half of this, that is £78,000,000, should be brought into this calculation as the rest of the Meat is imported frozen.

The British Farmer can probably continue to supply Meat to the butcher at 9d. per lb. if he improves his cultivations, the quality of his stock and methods of feeding, and if labour and cattle cake remain at present levels. All the saving that can

be made out of the 7d. per lb. surplus (and this saving should be much the larger part) can, therefore, come off the consumer's price of British beef. The demand for it would increase as compared with unsatisfactory imported meat, to the benefit of the home producer, and the people of England would benefit in every way.

In regard to *Milk*, in addition to the quantity used for making Butter and Cheese and for calf rearing, the last Census of Production Return shows that 850,000,000 gallons of Milk were sold off the Farms, and this goes, through dairy distribution, to the general consumers. Basing figures on recent milk practice and prices for London, and the other large towns where a uniform consumer's price is fixed by the Dairy Combines, we find that the Farmer, while only getting 2½d. a quart in the summer months, will, on the average, get 4d. a quart over the year. This price is delivered by rail, carriage paid to the towns by the Farmer.

The consumer, on the other hand, has to pay at present 8d. per quart.

Converting the above figures into totals, the Consumer pays :

	d.		£
To the farmers.....	@ 3½ a quart	or	58,000,000 p. annum
„ railway companies	@ 1 „	„	3,500,000 „
To the town dairy distributor.....	@ 4 „	„	56,500,000 „

The Town Distributor supplies the milk cans for the Railway Transport, and the perambulators for the street distribution, and his total capital in plant for carrying to the consumer has cost about

£1,000,000. At 15% for interest and depreciation, this is equal to only £150,000 per annum out of his £56,500,000.

If, by organization, the milkman goes from one door to the next (and all milk being practically the same in quality as in price, there is no reason why anyone should pick a special milkman), the roundsman and his boys carry it to the consumer's door for $\frac{1}{2}$ d. per quart, at which price the carrier would make over 56s. per week.

Allowing £5,000,000 a year, surely a very handsome profit to the Milk Combines, viz., 10% on the price paid to the Farmer, it is a distinct puzzle as to what happens to the odd £45,000,000 which the consumers pay, and the producing farmer, the Railway and the roundsmen do not get. A large portion of it is, of course, wasted in muddle and want of organized distribution, through several milkmen visiting the same street, etc. The Milk Combines cannot be absorbing the entire sum in profits!

In regard to Potatoes, the Farmer is getting less than one penny for three pounds of Potatoes delivered to the towns. What are you paying?

To sum up on the subject of unaccounted for and seemingly unwarranted difference between producer's receipts and consumer's payments, there seems to be an excess of £175,000,000 now paid by the consumer and kept in the hands of the distributors, viz. :

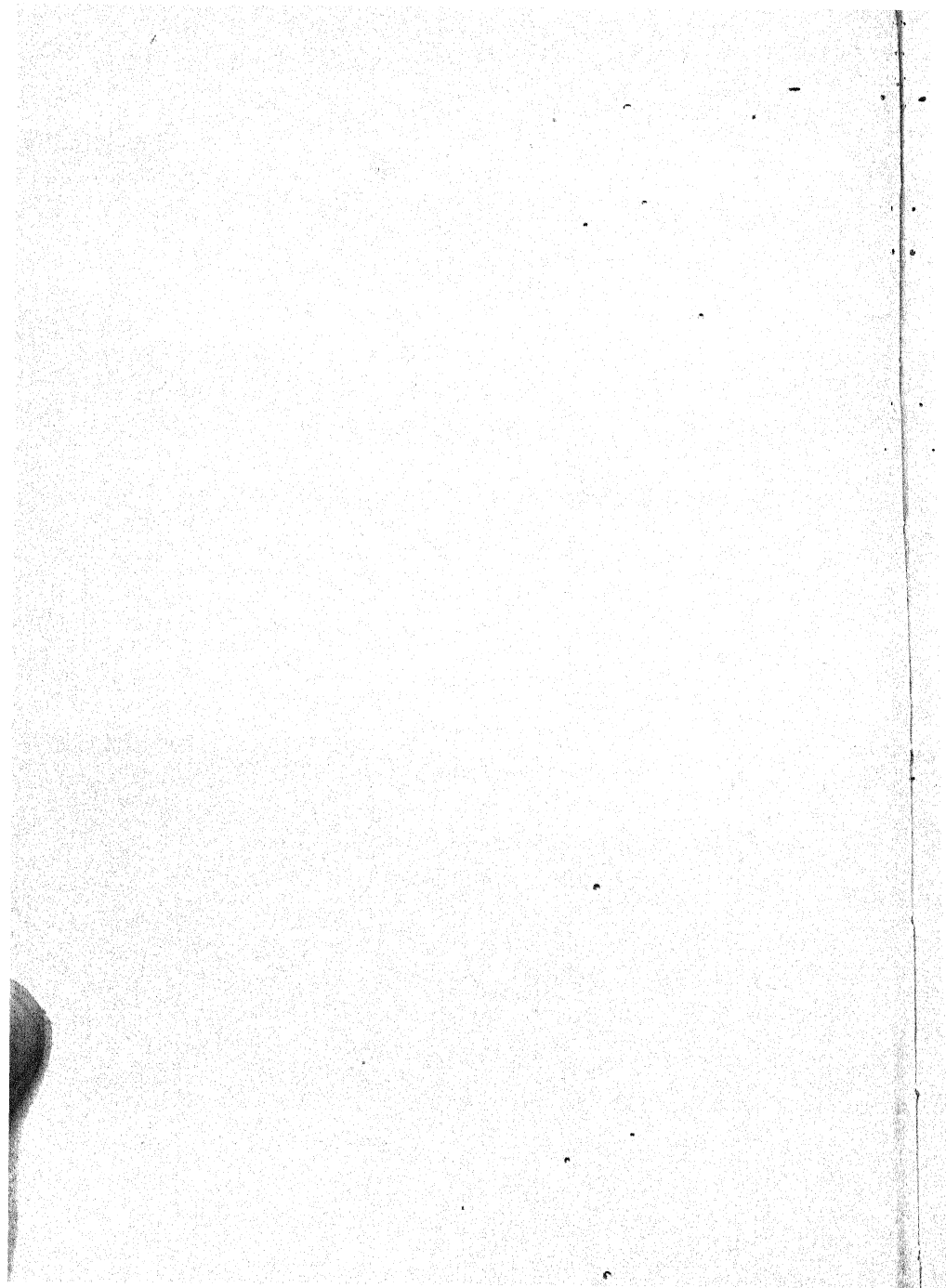
For bread	£52,000,000
For meat	78,000,000
For milk	45,000,000
Total	<u>£175,000,000</u>

over and above what is paid to the Farmer, the Railway, and in excess of the reasonable working costs of the Miller, Baker and Butcher, and after allowing about 10% profit on the cost of commodities they purchase and deal in.

Put in percentages, the part of the price paid by the Householder that is obtained by the Farmer (who has twelve months' work and cost in growing wheat, two or three years' work and expense in keeping animals till they are old enough for beef, or to give milk) is as follows :

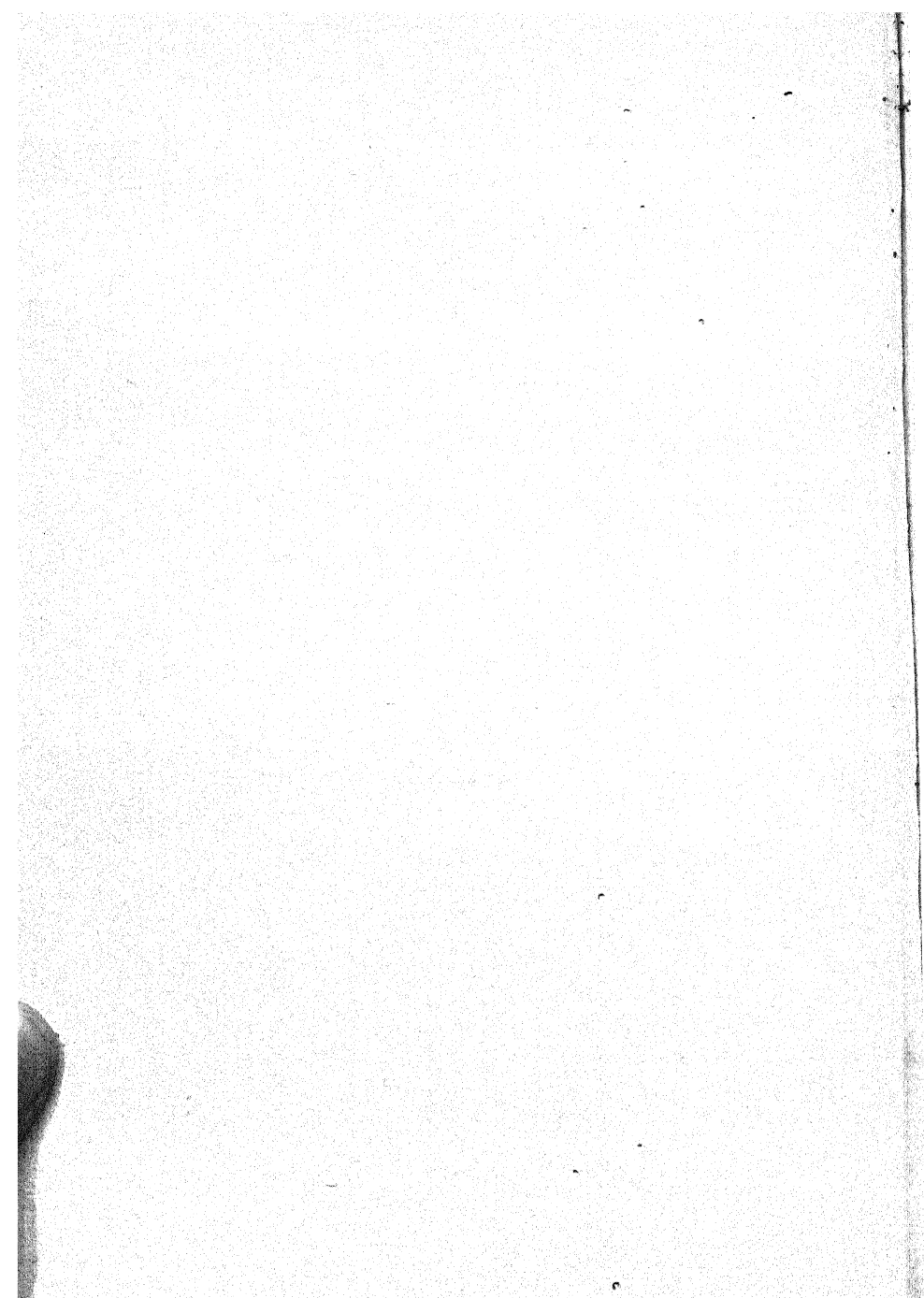
Farmer gets of the price paid for bread	35%
" " " meat	40%
" " " milk	47%
Miller, baker and transporter get of the bread price	65%
Butcher and allies " meat "	60%
Milk combine and transporter " milk "	58%

Will those who are willing to be active in the Nation's affairs, help to reduce costs by turning their attention to these matters? When they are reduced to reasonable proportions, the weekly bill for the essential foods of the Factory hands will be so low that they cannot grudge their fellow workers in the field a living wage, and the Country the prosperity that will come from home production of food.



CHAPTER XIX

LAST CHAPTER



IF a householder finds his weekly expenditure in excess of his wages, he must either make more, spend less, or go into bankruptcy.

So with a Nation, and, unless we find a way of paying for the imports of food and Raw Materials, the Town dweller will go hungry, or the factories will close. With the desperate push being made for our export markets by other Nations, can we hope soon to recover them entirely ?

Even if we do, we must not forget that the excess imports in former days were paid for, to a large extent, by the enormous income we derived from Foreign Securities, investments in Foreign Railways and undertakings of many kinds, which had to be sold during and since the War.

On the other hand, instead of receiving dividends from our former Foreign investments, we now find ourselves saddled with a gigantic debt to the United States, which, as an honourable Nation, we must pay, both as to principal and interest, over the shortest reasonable time. These payments will have to come out of what we do receive for exports of manufactures.

Is it not, therefore, essential that the Nation should, as a head of a family must, find a way of reducing expenditure ? The obvious way to cut

down Foreign expenses is to produce ourselves those things we consume, especially when we have the material and labour for doing so. In our soil we have all the material required for producing all our food, and in our unemployed and surplus distributors, we have ample labour.

Town dwellers and factory workers will realize, when they think these problems over, that, in order to produce all the Country's food, the pay of the agricultural labourer, and the farmer, must be sufficient for their maintenance. The Townsman will agree that the increase of his food bill by 2s. a week is not much to pay for the security and benefits of home production. All the £300,000,000 a year we can save will flow back—in some form or other—to the towns, and will give additional work to the factories and to all the Town dwellers.

On the other hand, if we continue to send £60,000,000 to the Argentine, £75,000,000 to the United States and about £300,000,000 to other Countries as we are now doing, for food which we could produce, this money will be spent by the Agriculturists of those Countries, not in purchasing English town-made goods, but will eventually find its way to the pockets of the factory worker of the foreign countries from whom we buy our food.

Again, if for a difference of one penny per 4lb. loaf, or one halfpenny a pound of Sugar—and it could never be more than this—the factory worker of this Country insists upon purchasing his food from

the foreigner, he will inevitably so deplete the British Farmer's earnings, that he, and his labourers, will have nothing wherewith to purchase from the English factories even what they now buy. In fact, thousands of men, instead of starving in the country, will, of necessity, flow to the factories in such numbers as greatly to reduce the Town worker's wages.

When the Town workers and everyone at present ignorant of the economics of the Agricultural situation, realize the facts, an overwhelming body of public opinion will be formed in favour of home food production. The Farmer will gradually be forced to cultivate his land in a more intensive manner in the interests of the Nation and he will employ more labour. Gradually the Trade Balance of the Country will become in our favour. Then we shall be a self-supporting country, as is the United States. There will be money to pay larger wages all round, and a better standard of living will be obtainable by all branches of the community. On the other hand, if we continue with our enormous imports, the Nation will drift towards bankruptcy and wages must fall heavily in every employment.

It is also well to remember that as there is an almost inexhaustible and steady market for home grown food, therefore its production is not subject to those slumps in demand which occur in all factory and manufacturing businesses. This regularity in demand for food causes regular and steady employment, unknown to Town workers where unemployment is so frequently recurrent.

The Country needs a National stable agricultural

Policy which fits in with the Policy of producing all the manufactured goods we can market abroad and require for home needs. We have ample labour for both food producing and manufacturing. Factories must have both labour and Raw Materials. All labour requires food as its chief Raw Material.

Is it not the worst form of suicide then to depend upon foreigners for the Raw Material which is the first essential for all labour, namely, food, when we could produce it practically as cheaply ourselves? Economically, is it not most unwise to import food when, with the exception of coal and iron, ore food is the only Raw Material we can ourselves produce?

Is it not the Nation's first interest to see that Agriculture, the oldest and largest industry, and the only one in which the entire profit remains within the Nation, is not sacrificed to the old political fetish of cheap food for Manchester, however serious to the rest of the community?

Is such food really cheap? Does it profit the cotton operative if his bread costs him fivepence when made of foreign wheat, and fivepence-halfpenny if made from English, if he only gets four days' work a week. If he uses English-produced food, he will secure the circulation of at least an additional £300,000,000 in the Country, the bulk of which will come back to the towns and give the workers their six days' employment.

As an aside. The writer is personally in favour of fixing the price of bread, for a period of twenty years, at sixpence a 4lb. loaf, the profit, or loss, in keeping it at that price, to be borne by the Nation as

a whole. There are many arguments in favour of this course, such as regularity, security, and providing a universal basis from which to consider the cost of living and fluctuations in wages. This proposal was put before Mr. Asquith's Government and before Lord Rhondda and was not accepted, and as public opinion is not yet much awake to this side of the food question, it is not dealt with at any length in this volume.

The welfare of the whole community depending upon increased home production of food in general, makes it essential that the town dwellers, who have the bulk of the votes and influence, must not only ungrudgingly allow those engaged in Agriculture to obtain a fair living, but must indeed force the Policy of securing large home production upon those whose duty it is to shape and guard the Nation's welfare.

These Chapters are not written with the object of urging any particular line of political Policy. No arguments are pressed upon the reader in favour of heavy Protection (although the Free Trade advocate could not well protest, if 2s. a week were subtracted from the householder's budget by reductions on tea, sugar and tobacco duties, and the same amount added to the bread bill). Nor is the reimposition of the Corn Production guarantees urged in their previous form. The facts are brought forward with the object of enlightening those who hitherto have not come into contact with the problems dealt with. It has been the desire to give a comprehensive view of the whole facts bearing upon English Agriculture from

the point of view of the Nation at large and the Town dweller in particular. He who reads them should be able, if not to produce a policy, at any rate to give reasonable consideration and form a decision on proposals which will, from time to time, be discussed in Parliament and in the Press.

The consensus of opinion of the Public, based on a knowledge of facts, and firmly voiced by the citizens of the Country, is the motive force behind any great programme of reform and improvement, if such is to be of lasting good. The Government of the day is impelled by such a power, and will work up the broad lines of policy desired by the people, into practical, and active schemes for carrying it out.

If the colliery owners of certain districts elected to work half their men and to have only half the necessary winding engines, the Government would, in the interests of the consumers of coal, very soon find a way of getting coal owners to produce enough to keep the factories, railways and households going. If the railways found it cheaper to run half their trains, the Government would, in the interests of the Nation, find a way of arranging for a reasonable supply of transport. Why not find a way of paying Agriculture sufficient to produce our food ?

If the Farmers, and land workers, as a whole, are made to understand what the Nation requires, they will gladly do their share, but as they have to spend money ahead, and organize ahead, they must be assured of markets well ahead, and prices which will

give security, at any rate for their bare existence, with some chance of a reasonable profit. Ninety per cent. of the farming land of the Country is in the hands of about 225,000 Farmers. Ten or twenty per cent. of them may be stubborn and difficult to convince, but, if security were guaranteed, most of them not already doing so, will rapidly learn to intensify their output, but they will all require absolute security. The rebuffs and unfairness dealt out to them for the past fifty years naturally make them very shy of being left to the tender mercies of a puppet in Office, who gets an Act passed by Parliament giving a four years' absolute guarantee to Farmers, and, within a year, gets Parliament to repeal the Act and tear up the pledge given by the Nation, thus ruining those who have bought their land or otherwise built on the guarantee.

The larger issues of increased home production turn upon the increase of wheat growing and ploughed land farming. If the Farmer received an unbreakable assurance that a gradually increasing proportion of English-grown wheat shall compulsorily be used in bread making, he would feel that he had a guarantee and would accept it as good security. The consumer of the bread should be willing to risk the possible increase of the price he has to pay for the 4lb. loaf by one halfpenny, should Foreign wheat drop below 35s. a quarter, because in that case, the English farmer would have to be paid by the Miller, and on a sliding scale 5s. to 10s. a quarter more than the price of imported wheat.

Beside our own economic needs and benefits, there

are other reasons why it is essential we should produce our own food, especially wheat and pigs. In all probability, Germany never would have had a War with us, if she had not counted on the knowledge that we were so dependent upon oversea imports to keep our population fed, even during a short War. Future Submarine development, and air-carried destruction of ships, make it essential we should be much more self-supporting in future.

In any case, the production of our own food will, at no very remote date, be forced upon us by the logic of circumstances. The rich virgin soils of the world existing in the climate suitable for food production are already all in use. Every day the population of the world is rapidly increasing, and the food requirements become more intense. It is estimated, for instance, that the United States will have a population of 200,000,000 by 1950. Long before then, however, the States will be importing cereals, as they are already sometimes importing meat. Again, there are only five large food-exporting Countries in the world now, and if three of them together had harvests that were equal to the worst they have known in the last twenty years, we, and other importing Countries, would be on the verge of starvation.

Everything, therefore, points to the necessity for increasing our home output, and the object of these pages has been to show that our immediate prosperity depends on increasing intensive cultivation as rapidly as is expedient.

We have seen that we can do so, that certain entire Counties and certain well-managed farms in almost

every district of the Country, are to-day producing over 100% of our requirements, but through want of knowledge, lack of understanding, and a feeling of insecurity, the bulk of our producers are still working the industry on a scale, and by methods similar to those followed by the hand-worked Iron Furnaces of sixty years ago, or at about the state of development reached by the handloom weavers of that period.

There is as much room for, and reason for, increased enterprise in the development of English Agriculture now as there was in mid-Victorian days for the development which has since taken place in factories and furnaces. Germany and other countries have doubled their production of food in forty years and believe they can still increase to a further very large extent. We alone have remained stationary.

Until the people of this Nation realize what they require in the way of home production and show that not only do they intend to have it, but that they are also willing to help it forward, the Townsman must not blame the Farmer if progress is very slow. Under the pressure of war and the encouragement of the Food Production Department, the Farmers did increase their output in the year 1918 by nearly one-third. We have in this a strong indication of what could be done by a more prolonged effort, based on security against loss.

Nearly everyone has a strong prejudice against the Government carrying on business enterprises, and there is certainly no need for Civil Servants to manage English farms. In the past, however, Parliament has found it necessary, in the interests of the Nation, to

regulate railway rates, and passenger tickets; the rates panel doctors are to receive; the conditions under which local authorities may obtain loans; compulsory school age for children and the syllabus of what they are pleased to call education; the time of closing public-houses; the regulation of traffic, and other control of individuals by the police. Why should not the Government also establish rules and regulations which should guide and assist Agriculture?

Why should not a Bread Board be formed, as an example, on the model of the London Water Board, to supervise the preparation and distribution of bread, milk, and possibly meat? A Board on that model would be outside Government control in the ordinary sense of the word, but by organizing methods of distribution and directing existing distributors in a less wasteful and competitive method, such a Board should enable consumers to get their bread at an extremely low price.

No excess profits would be made as there would be no hungry shareholders wanting big dividends. Such an "Authority," or Board, avoids the evils of political influence, the unenterprising and unbusinesslike methods of Civil Service control, and enables expert Business Men to carry out, at a very low cost, the kind of enterprise which, if left to competing individuals, trusts, combines or associations of distributors, must necessarily enormously enhance the cost of the people's food.

Such an "Authority" could show the millers and bakers how to convert 75 lb. of wheat and 25 lb. of water into 100 lb. of bread and charge the public less

than the 180% above what the farmer gets for his wheat, which is the state of things to-day.

Surely there is a difference between State Socialism, and such direction of an industry as would prevent the consumer being charged 150% above what the Farmer gets for his meat ?

Regulations have existed for fifty years preventing half a dozen gas Companies putting pipes side by side along the same streets, which would run up the cost of gas. Would it be unreasonable if some similar regulations were formulated in regard to half a dozen milkmen running up the costs of distribution by each going over the same ground ? This muddle must surely be the chief reason which causes the Milk Combines to charge the householder 114% above what the farmer gets for the milk.

Even if the Government cannot give direct help to production, it can no longer ignore, on the one hand, the desperate state into which British Agriculture has fallen, and, on the other, the enormous advantages to be gained by the Country, from every point of view, through the increase of home production. Therefore, it must cease to govern or must help in every way to develop the output of home-grown food.

Government is established to lead the policy, thought and enterprise, and assist all the industries, of a Country, and not one of them only. It ought to introduce and carry into effect regulations, and assist the development of Agriculture, which has been neglected in the past, while Manufacture and Exports have received an enormous amount of consideration.

While not putting forward any particular form of

policy, which alone should be adopted, the following matters are certainly amongst those which ought to be remembered when the National Programme is being formulated.

It has been shown in Chapter V. and Chapter IX. that there is no valid reason, whether through want of area, suitability of soil or climate, or labour, or any other substantial reason, why four and a half million more acres of our farming land should not be brought under the plough by the breaking up of grass land. A programme on that basis is set out in the following Table. The yields per acre in the Table are calculated conservatively on the average production of the past ten years, although with increased cultivation and improved fertility, at least an additional 20% more could be grown on each acre. The kinds of crops giving most direct human food are arranged for in the Table to be grown rather more frequently than is the present practice.

In order that the results of the cropping proposed in the Table should be comparable with the entire amount of food we require, for both humans and animals, the output is converted in Col. 3 into Food Units, i.e., into tons of Starch Equivalent. Col. 4 shows the total food (also on the same basis of equivalent food values) we use now, by adding together the home production and the total imports of food used by humans and animals. It will be noticed that the total output of the proposed programme of future home production will supply the total required for all our needs.

TABLE XXI

PROPOSED CROPPING, SO AS TO PRODUCE ALL FOOD REQUIRED
BY THE UNITED KINGDOM FROM ITS OWN SOIL.

	Proposed cropping. Acres.	Production.		Actual consump- tion, i.e., total of imports and production. Tons of starch equivalent.
		Tons.	Tons of starch equivalent.	
	(1)	(2)	(3)	(4)
Wheat	8,000,000	7,140,000	5,212,000	5,489,000
Barley	3,000,000	2,528,000	1,871,000	1,913,000
Beans and Peas ..	1,000,000	693,000	471,000	304,000
Oats	5,000,000	3,960,000	2,495,000	2,370,000
Total Cereals....	17,000,000	14,321,000	10,049,000	10,076,000
Potatoes.....	1,200,000	5,740,000	1,091,000	1,445,000
Total starch equi- valents in direct human food	—	—	11,140,000	11,521,000
Turnips	1,800,000	29,260,000	1,755,000	1,519,000
Mangolds	1,000,000	19,340,000	1,354,000	649,000
Wheat straw	—	10,000,000	1,200,000	248,000
Barley „	—	3,000,000	540,000	305,000
Oat „	—	5,625,000	1,068,000	709,000
Temporary grass :				
{ For hay	3,000,000	5,231,000	1,830,000	} 1,830,000
{ Not for hay ..	—	—	—	
Total arable or plough acres	24,000,000	—	—	—
Permanent grass :				
{ For hay	6,798,000	10,164,000	3,455,000	} 3,455,000
{ Not for hay ..	15,943,000	—	—	
Total animal feed- ing stuffs	—	82,620,000	11,202,000	8,715,000
Other imports in } 1913..... }	—	—	—	2,006,000
				10,721,000
Grand Totals....	46,741,000	102,681,000	22,342,000	22,242,000

NOTE.

U.K. output of cereals and potatoes, 1913, was equal to..	Tons starch equivalent.
" " food for animals ..	5,652,000
" " " ..	8,715,000
Total imports of cereals and animal foods, 1913	7,875,000
Total United Kingdom normal consumption.....	22,242,000

On paper, therefore, the production of our entire food requirements is accomplished by simply breaking up four and a half million out of twenty-seven million acres of grass land and growing cereal crops somewhat more frequently in the farmer's rotation.

The human factor has, however, to be taken very much into consideration in dealing with this problem, and, although 90% of the farming land of the Country is in charge of less than a quarter of a million farmers, yet many of them will require a great deal of convincing before they abandon their present unintensive practice. It is not much to be wondered at if they are not willing to risk fresh enterprise, further capital and additional labour, until they see some definite security.

One form of giving practical security has been suggested above in regard to a portion of home-grown wheat being compulsorily used in bread making. The Farmer must be made to feel that the Nation is behind a sound Agricultural Policy, and that he is not again going to be left in the lurch.

Let the Farmer once feel that the Town folk want and will insist upon increased farm production, and that they are willing to assure him against starvation in carrying out what is for the Nation's benefit, and most of them will put their backs into improving matters. They must, however, be fully educated by the Cabinet, by Members of Parliament, by the Press and other means of communicating public opinion, and must be made to realize that the Nation does intend to have such a Policy and that it is to be a permanent one.

They will, then require an immense amount of information, technical and economic, to help them in their work. This flow of information should be continuous, and, instead of circulating amongst a very limited number as at present, the Journal of the Ministry of Agriculture might, for example, be used as a very valuable means of bringing before all the Farmers of the Country the Policy itself and the continual knowledge of what help can be given by science, practice and new developments. If this Journal were distributed gratis to, let us say, 200,000 Farmers, such circulation would cost less than £25,000 a year. A Committee of Agricultural Scientists and practical men, under the Chairmanship of Sir Daniel Hall, could secure for each month's circulation of this Journal, a number of enlightening facts, which would help towards progress, and keep up the Farmer's interest.

* * * * *

The Policy of the Government and of the Nation might, therefore, very well include the following matters :

(a) The breaking up and putting one-fifth of the present grass land under the plough ;

(b) The improvement of the 22,000,000 acres of land still to be left down in grass ;

(c) Improvement of cultivations by considerably increasing the usual stirring, mixing and preparing of plough land for the crops to be grown ;

(d) Either preventing Farmers occupying more land than they have capital to farm properly, or assisting Farmers to obtain the necessary capital to cultivate their holdings in a more intensive manner ;

(e) Educating Farmers to the necessity of producing crops that will give a larger proportion of direct human food ;

(f) Advocating and giving inducement for the production of a much larger quantity of bacon, pork and hams ; and the erection of Bacon Factories.

(g) An extra million of cows to be kept to provide milk for dairy produce and additional beef ;

(h) Benevolent assistance, if no more, towards securing a much larger quantity of cheap fertilizers and lime than hitherto available :

(1) By developing the production, or fixation of Nitrogen through the use of Coal ;

(2) The Production of a larger quantity of Basic Slag by using English Iron Ores instead of importing those free from phosphorus ;

(3) The production of larger quantities of low-priced Superphosphate in the Country and obtaining British control of foreign Phosphate beds ;

(j) To bring pressure to bear on Counties, like Somerset, which only produce half of what the good Counties are supplying towards the Nation's food ;

(k) To secure, by guarantee, or otherwise, the establishment of Beet Sugar Factories all over the Country to produce the bulk of our Sugar requirements ;

(l) To see that Agriculture is treated fairly as to the proportion it pays of the Rates of the Country, and also in regard to Schedule A of the Income Tax ; and that Railway rates are reduced to little above the bare cost of transport.

(m) To formulate regulations towards preventing the middleman's waste, and excess profits, with a view of lowering the price the consumer has to pay for bread, milk and perhaps meat. Permanently to secure to the home wheat producer a certain and increasing market for a large output of wheat and a sufficient margin to give the agricultural worker a reasonable living ;

(n) To secure the establishment in each populous centre of free retail markets for food, including fruit, vegetables, poultry, eggs and butter.

If the people of the towns and the rulers of the Kingdom will give a reasonable amount of thought to British Agriculture, they will realize that, from the soil, will come the renewal of the Country's prosperity and a peaceful and happy existence for all its People.

THE END

It is my intention to devote any profits which may come to me as author of this Edition to spreading Dwellers a knowledge of the facts this Book is written to demonstrate.

CHARLES FIELDING,
Billingshurst, Sussex.
4th February, 1923.